Amirdovlat Amasiatsi

A Fifteenth-Century Armenian Natural Historian and Physician

by S. A. Vardanyan
Mashtots Matenadaran, Yerevan

Translated from the Russian
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This book is dedicated to the 1700th Anniversary
of Christianity in Armenia

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Preface

The creative work of the renowned Armenian scientist and physician of the fifteenth century, Amirdovlat Amasiatsi, is a result of the historical process of development of natural sciences and medicine. In his work, the most distinguishing features of his time, certain tendencies of the future as well as links with the past, are clearly visible, which make great people of the past time become our contemporaries.

Keeping alive the traditions of great philosophers, natural historians and physicians of medieval Armenia—Yeznik Koghbatsi, David Anhaght, Anania Shirakatsi, Grigor Magistros, Mkhitar Heratsi, and many others—Amirdovlat Amasiatsi in his work elucidated the whole array of important problems that stood before natural science and medicine of the Renaissance. Being the predecessor of Paracelsus, Amasiatsi, in his practice of medicinal pharmacognosy, botany and mineralogy, viewed practical experience as the ultimate criterion, which challenged established scholastic science of the time.

Being one of the brightest examples of Armenian literary heritage, the scientific heritage of Amirdovlat Amasiatsi had by the end of the nineteenth century come under the scrutiny of the distinguished Armenologists Gh. Alishan, Gh. Hovnanian and V. Torgomian. In 1926, K. Basmadjian published in Vienna Amasiatsi's encyclopedic work, *Useless for Ignoramuses.* That was the first attempt to compile the critical text of the book, based upon manuscripts from libraries in Vienna, Paris, London, and Constantinople, as well as from some private collections. In 1940, S. Malkhasiants published in Yerevan another important work of Amasiatsi, the book *Benefits of Medicine*, the critical text of which was based upon manuscripts from Mashtots Matenadaran. The life and creative work of the Armenian natural historian and physician found its way into *The History of Medicine in Armenia* by L. A. Hovhannisian and in many publications in Armenian, Russian, as well as some other languages.

In the 1980s, because of the twin jubilee—the 550th anniversary of the birth of Amirdovlat Amasiatsi and the 500th anniversary of the

book *Useless for Ignoramuses,* Stella A. Vardanian, the chief scientific investigator of the Mashtots Matenadaran, translated the book *Useless for Ignoramuses* into Russian. This book is the first scientific study dedicated exclusively to the life and work of Amirdovlat Amasiatsi. In this book, based upon careful study of published and unknown manuscripts, an attempt was made to investigate the scientific heritage of the medieval Armenian scientist from the point of view of contemporary natural sciences and medicine.

The present translation into English was undertaken as a part of continuing research in ethnobotany at the University of the Sciences in Philadelphia. Nowadays, it is well accepted that numerous leads for potential new drugs exist in ancient classical literature. This fortifies the points made by the author, Stella Vardanian, that continuous research in this area has justified and verified many older uses for plants as medicines, and opened the way to uncover many new and unique pharmaceuticals from the understudied flora of the Caucasus region.

ARA DER MARDEROSIAN

Translator's Note

The most common English names for all plants, animals, minerals, chemicals and some diseases were substituted for Russian ones wherever possible. Latin names for all of the above were added as footnotes for reference purposes. Contemporary conversions for ancient measures of length and weight, as well as explanations for ancient terms and official titles were also added as footnotes. All foreign words were italicized. Phonetic transcription for all foreign words and proper names was given in the way that conforms to standard English.

MICHAEL YOSHPA

A Brief Summary of Medieval Armenian Medicine and Natural History

Over the centuries of its existence, Armenian folk medicine gathered an enormous amount of information about medicinal properties of local plants, animals and minerals, which became a foundation for the Classical Armenian medicine and natural history.

According to ancient authors, Armenia was the place from which many medicinal plants originated. In the *Anabasis*, Xenophon had gathered information about excellent Armenian wines, beer, almond oil, sesame oil, turpentine, and aromatic incenses, for which Armenia was famous all over the world [1:107–108]. Tacitus mentioned in his *Annals* certain rural (i.e., folk) medicines that were used by Armenian physicians to treat wounds [2:1:216]. The ancient botanist Dioscorides, who was of Cilician origin, was also well aware of medicinal plants of Armenia. "The best *amom*," writes Dioscorides, "is yellow in color, has yellowish wood, and has a pleasant aroma" [3:10]. According to Pliny the Elder, a wide variety of gummiferous plants was exported from Armenia, among them the famous *sylphius* or *laser* (*Laserpitium* L.), which was highly praised among ancient Romans [4:445].

In many works of Armenian historians there is considerable data about the development of phytotherapy in ancient Armenia. The father of Armenian historiography, Movses Khorenatsi (fifth century A.D.), wrote in his *Armenian History* that king Vagharshak (second century B.C.) undertook certain measures to improve the sanitary conditions of the regions of Taik and Kogh, by creating in this region medicinal gardens, where medicinal plants from different areas of Armenia were grown [5:81]. Another Armenian historian, Ghazar Parabetsi (fifth century A.D.), has similar information: "There (in Ayrarat) were found roots of various plants, used according to the lore and knowledge of physicians, as medicines or quick-healing plasters, that restore the health of people long suffering from diseases" [6:26]. Wild plants were also cultivated in the gardens of King Artashes II in Artamet (first century B.C.) [7:53]. According to a legend, the famous toxicologist of

the ancient world King Mithridates, used to prepare his famous *teriak* (antidote) from healing herbs of Armenian flora [8:1:55].

Medicines of inorganic origin were abundant in the interior of Armenia—especially Armenian clay (also called Armenian bole), Armenian stone, borax, compounds containing mercury, iron, led and zinc, were also popular. "There are also some other mines there (in Armenia), among them for example, where so-called *sandik* (cinnabar or vermilion) is mined, which is called "Armenian dye" and is much like purple," wrote Strabo [9:499].

In the Rshtunian Mountains on the bank of Lake Van, according to the famous Armenian historian Favstos Buzand (fifth century A.D.), there were abundant deposits of iron and lead [10:24]. Medicines obtained from these minerals were used for treatment of skin and eye diseases, as well as wounds and tumors. Ibn Sina highly praised the healing properties of Armenian clay, which he also called "Ani clay" after the name of the Bagratid capital Ani, where clay deposits were situated. Ibn Sina said in *Canon*: "Armenian, or Ani clay acts miraculously on wounds. It is especially helpful against tuberculosis and plague fevers. A lot [of people] were spared [during] the great plague, because [they] kept drinking [this clay dissolved in] weak wine" [11:2:303].

Medicines of animal origin were also widely used in Armenian folk medicine: sexual gland extracts, brain, liver, bile, spleen and rennet extract from stomachs of some animals, etc. Such medicines were used as tonics, stimulants and antisclerotics as well as antidotes. Many generations of medieval Armenian physicians and specialists in natural history found folk medicine an inexhaustible source of invaluable information. A large number of such medicines is mentioned in pharmacognosy books of ancient authors, and in later times in various Arabic sources.

After the creation of the Armenian alphabet in the beginning of the fifth century A.D. by Mesrop Mashtots, Armenian literature and booklore was established. Apart from numerous translations of ancient authors—Plato, Aristotle, Hippocrates, Asclepiades, Democrites, Galen, Oribasius, etc.—there started to appear many original writings by Armenian authors on natural history and medicine. Views of Armenian historians of nature and physicians were developing under the influence of writings of ancient authors translated over the fifth

through seventh centuries by representatives of the Hellenophile school [8:1:150–186; 12; 13]. In the beginning of the eighth century, books, *On Human Nature* by Nemesius of Emesa, and *A View on Human Composition*, by Grigory of Nissa were translated by distinguished Armenian scientist Stepanos Siunetsi, assisted by David Hypatos. Therefore, over almost three centuries, an intensive work on creative assimilation of ancient scientific heritage took place in Armenian centers of science, where data from empirical folk medicine were reviewed on the basis of this heritage.

Results of this work are clearly seen in a polemic writing *Refutation of Sects* by the Armenian philosopher and natural historian of the fifth century, Yeznik Koghbatsi. In this work the author demonstrated profound knowledge of Hippocrates' medicine and ancient lore of "four cardinal moistures." Just like Hippocrates, he linked the origins of diseases with a disruption of an equilibrium between cardinal moistures caused by a variety of unfavorable internal and external factors. He thought that these factors played an important role in the origin of nervous and mental diseases. Yeznik showed that the latter are caused primarily by natural causes, and first and foremost by brain exhaustion. "In the case of brain exhaustion," wrote Yeznik, "man loses consciousness, talks to walls and struggles with spirits. That is why physicians insist that devils, that enter human bodies, do not exist, and that all these conditions are nothing but diseases that they can cure" [14:180]. Yeznik Koghbatsi, who was from Ayrarat, famous for its medicinal herbs, was an expert in medicinal botany. This is what he wrote on dosages and the synergistic effect of medicines: "Poisonous Hemlock[1] is known as [a plant that is] deadly poisonous under certain circumstances, [but it is] used by physicians for treatment of chronic bile diseases. One of the species of the Milkweed[2] plant is poisonous, if taken alone, but in mixture with other medicines [it is] helpful against diseases of the bile and saves one from death" [14:67]. Therefore, an experimental approach in pursuit of knowledge, despite opposition to mainstream scholastic theories, was characteristic of Yeznik as well as of many other Armenian physicians and natural historians [8:1:125].

Problems of natural history and medicine were of special interest to

1. *Conium maculatum* L.

2. *Euphorbia sp.*

another famous Armenian philosopher, David Anhaght (fifth-sixth centuries), who received his education in one of the centers of Hellenistic science, Alexandria. In his works, *Definitions of Philosophy*, *Analysis of Porphirius 'Introduction'* and *Interpretation of Aristotle's 'Analytics,'* he dealt with problems of anatomy, physiology, pathology and pharmacology as well as medical ethics [15:260; 16]. In *Definitions of Philosophy*, he analyzed weak and strong points of the empirical method. "Experience," he wrote, "is general knowledge, not based upon knowledge of causes, just like in the case of experienced physicians who, knowing a multitude of medicines, do not know [what] causes medicine's [mode of] action. Experience is also remembering coupled with unconscious imprinting of the same repetitive phenomena in a human being. So, an experienced physician uses medicines, remembering and imprinting their repetitive modes of action" [15:75]. In David Anhaght's works also exists one of the earliest Armenian references on the practice of anatomical dissection [15:110]. It is worth mentioning that dissection of cadavers and the method of vivisection used in ancient Alexandria found their use in the medical schools (*Bzhshkanots*) of medieval Armenia.

Another Armenian scientist—Anania Shirakatsi (seventh century), in the year 667, wrote the code of science *Knnikon (Canon)*, that contained not only works on mathematics, astronomy, and a theory of calendar and philosophy, but also several distinguished works on medical science [17]. Shirakatsi was also quite knowledgeable in medicinal botany. In one of the handwritten codes, in which data about medicinal plants, such as Bryony[3] and *hamaspyur*[4] were represented, there is an indication that Anania had found *hamaspyur* in Dzoghkert (Ayrarat) and used it for medicinal purposes [18, folio 78b]. This plant, dedicated to the goddess of health, Astghik, was once abundant in Armenia, but by the seventh century became extremely rare and grew in inaccessible places [19:356]. Later, this plant, as well as Laserwort,[5] was rapaciously overharvested and vanished from Armenian flora.

Despite a temporary decline of Armenian culture in the eighth and ninth centuries resulting from an Arab invasion, after the Armenian

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3. *Bryonia sp.*

4. *Lychnis sp.*

5. *Laserpitium sp.*

state was restored and the independent Bagratid kingdom (ninth-eleventh centuries) was created, Armenian culture began to bloom again [20:577–618]. The Bagratid capital Ani became one of the world's centers where sciences, arts and crafts flourished. In medieval academies of Ani, Sanahin, and Haghpat, medicine was taught alongside philosophy and natural sciences. Widely accepted as one of the most famous thinkers of that time, Hovhannes Sarkavag (1045–1129), was found to have a lot in common with representatives of the European Renaissance. "Researcher must be comprehensively educated and knowledgeable," wrote Sarkavag. "He has [to study] not only Holy Scriptures, but also secular sciences. But even if he wholly grasped them and is very proficient in them, there is no precise knowledge without experience. Only experience is unshakable and unquestionable" [21, folio 250a; 22:17]. Here the Armenian philosopher foresaw the famous saying of Roger Bacon: "Sufficient knowledge is impossible without proper experience."

At the same time and in a similar intellectual atmosphere lived another physician and philosopher, Grigor Magistros (d. 1058), a contemporary of Ibn Sina, and one of the major representatives of the Ani school. Being an excellent scholar of ancient culture, he maintained correspondence and had close connections with many Armenian and Byzantine scientists. In this correspondence were reflected not only scientific interests of Grigor Magistros but also morals, manners and customs of the time. One of his correspondents, the Byzantine physician Kyriakos, while lecturing in Ani on digestive tract functions, stated in the course of dispute that nothing outside his specialty interests him. The unsoundness of such an approach was shown in a letter from Grigor Magistros, who greatly emphasized an interconnectedness of all phenomena in nature. In his polemics with Kyriakos, the Armenian scientist showed profound erudition in medicine and natural sciences as well as deep knowledge of works of ancient philosophers and physicians. According to some indications, Grigor Magistros was not only a theoretical scientist, but he also practiced medicine. In one of his letters he described in great detail clinical aspects of smallpox, differential diagnostics of which was one of Ibn Sina's main topics. Magistros was interested in causes of fevers and in methods of their treatment, phytotherapy in particular. Among

medicinal plants he recommended Hemlock[6] seeds in cases of fever. "Its seeds, mixed with Saffron[7] and applied to forehead, diminish inflammation of hot wounds, and many of them are helpful not only against fevers" [23:96].

In the Ani school Armenian authors created original medicinal works, or so-called *Bzhshkarans*, which also contained general biological information. The most famous was the *Bzhshkaran* created during the reign of famous king Gagik (Gagik I from the dynasty of Ani Bagratids, ruled 989–1020), i.e., approximately at the same time as Ibn Sina's *Canon*. The name of the author of this distinguished work is unfortunately unknown. According to some sources, it could have been Grigor Magistros [24]. But Magistros's works were saturated with Hellenisms and possessed a somewhat exuberant style which differs greatly from the unpretentious and almost conversational style of Gagik's *Bzhshkaran*, written in Middle Armenian. Being a modest worker, who regarded luminaries of the ancient science with great veneration, the author of Gagik's *Bzhshkaran* wrote sparsely about himself. Only in several places in the book do we hear his own voice—the voice of a person profoundly knowledgeable about Armenian flora and fauna as well as the dietary and domestic customs of his people. In a chapter, "About all Kinds of Animals and Fish," he brings forth information about the famous Armenian trout, adding: "Although [ancient] sages do not mention it, I will add these words out of my own feeble mind" [25, folio 56a]. In a chapter, "About all Kinds of Grains," he makes the following remark: "Bread, baked in *tonir*[8] tastes better than one baked in the bakery or in any other way" [25, folio 48a]. Indeed, a special kind of Armenian bread—*lavash*, baked according to the ancient way in a *tonir*—is popular even in our time.

Gagik's *Bzhshkaran* is an invaluable work mostly dedicated to pharmacology and dietary science. Several other topics, including traditional Hyppocratic diagnostics and prognostics, are also discussed in the *Bzhshkaran*. Classical teaching about four cardinal moistures is explained in an elaborate chapter, "On Human Nature," where voluminous references to works of Asclepiades and some other ancient

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6. *Lactuca virosa* L.

7. *Crocus sativus* L.

8. Usually an outdoor clay or metal oven.

authors are made. Embryology is discussed in a separate chapter named, "How a Child is Formed in the Mother's Womb." In this chapter there is a valuable excerpt from an otherwise lost work of an ancient Roman physician, Democrates. Chapters from Gagik's *Bzhshkaran* dedicated to problems of general biology are often found in other handwritten codices, which indicates a great deal of interest in these problems in medieval Armenian academies.

In chapters dedicated to pharmacology and dietary science, the author of Gagik's *Bzhshkaran* made an attempt to generalize extensive phytotherapeutic heritage of folk medicine from the point of view of the Dioscoridian school. The author makes direct references to Dioscorides in the chapter, "On Plants, Trees and their Beneficial Properties": "The great philosopher Dioscorides had told us about plants and showed their beneficial properties" [25, folio 44a]. A direct link with Dioscorides' works is also seen in several other chapters: "On All Kinds of Vegetable Oils," "On All Kinds of Vegetables and Greens," "On All Kinds of Spices," "On All Kinds of Incense," "On All Kinds of Cereals" and "On All Kinds of Fruits."

It is still unknown whether a Classical Armenian translation of Dioscorides' work *Materia Medica* existed. There is circumstantial evidence pointing to its existence. For example, botanical terminology in Gagik's *Bzhshkaran* mainly consists of Armenian terminology, but in cases when a Greek term is used, an Armenian translation is given as well, whereas Arabic terminology is scarce. Therefore, by the tenth century Armenian botanists and pharmacognosists were well aware of Dioscorides' work and used his terminology, which could only be possible if an Armenian and not an Arabic translation of his work was available at the time. Arabic and Persian influence is only discernible in several chapters of the *Bzhshkaran*, which were dedicated to medicines with complex formulas, techniques of preparation of which was well elaborated on in eastern pharmacopoeias—*akhrabadin*es. Apart from that, names of eastern physicians, including Ibn Sina, were not mentioned in this ancient Ani pharmacognosy, which was created in the traditional Hellenistic spirit, characteristic of medieval Armenian academies.

In later times, the fate of Gagik's *Bzhshkaran* was largely dependent on the Cilician school, which became one of the most important scientific and medical centers after the destruction of the Bagratid

kingdom in 1045, followed by general cultural decline in native Armenia.

In the Cilician Armenian kingdom (which existed until the end of the 14th century), new possibilities, based upon the rich cultural heritage of indigenous Armenia, were created for the development of arts and science [26:145]. In the Rubenid capital city of Sis, and in the residence of Armenian catholicoses (city of Romkla), there gathered the cream of Armenian intelligentsia: Nerses Shnorhali, Toros Roslin, Vardan Aygektsi, Vahram Rabuni, Mkhitar Heratsi, and many other poets, painters, musicians, philosophers and physicians, all of whom participated in the revival of Armenian culture. Armenian kings from the Rubenid-Hetumid dynasty paid a great deal of attention to the development of practical medicine and natural sciences. King Levon II (r. 1185–1219), his daughter, queen Zabel, and King Levon III (r. 1270–1289) founded hospitals and shelters, and generously supported them [8:2:179–186]. At these hospitals, medical schools were created under the supervision of experienced physicians. Apart from that, natural sciences and anatomy were taught at the Cilician academies, e.g., in Nerses Lambronatsi's academy.

The absence of clerical and state restrictions against cadaver dissections, which were strong in Islamic and European countries, had greatly contributed to the progress of anatomy and physiology at these academies. The distinguished Armenian scholar, Hovhannes Yerznkatsi (13th century), who arrived in Cilician Armenia in 1281, wrote "The experienced and wise physician, who could get at his disposal some condemned criminal, could inflict upon him numerous sufferings and torments, and could eventually brutally kill him while studying the conditions of his organs, nerves, blood vessels and entrails. Thus by making one person suffer, [such a physician conducts work] of great benefit to mankind" [27]. This view characterizes a high level of development of anatomical and physiological studies at medieval Armenian academies.

The life and work of another classic scientist of medieval Armenian medicine, Mkhitar Heratsi, is also closely interwoven with the Cilician school. He, like many other gifted youth from indigenous Armenia, found his way there, leaving his native city of Her (nowadays known as Khoi in Iran). The precise date of his birth is unknown. There is an indication that he was probably born in the first quarter of the twelfth

century [8:2:77]. After graduating from one of the medical schools of Cilician Armenia, Mkhitar Heratsi, apart from medical practice, paid considerable attention to scientific research and was eventually granted the scientific degree of *Bzhshkapet.*

During the decade following 1160, Mkhitar Heratsi enjoyed wide popularity as an experienced physician, natural historian and philosopher. Catholicos Nerses Shnorhali dedicated to Mkhitar his philosophical poem, *On Sky and its Heavenly Bodies*, written "upon request of the physician and astronomer Mkhitar" [28:257]. During these years the Armenian *Bzhshkapet* created such distinguished works as *Pathology* and *Akhrabadin*, dedicated to problems of anatomy, physiology, pathology, clinical medicine and pharmacology. Due to the tragic fate of the Armenian folk, all of these works were lost or survived as excerpts included in books of his contemporaries or later authors. But even from these excerpts ("On the Structure and Creation of an Eye," "On the Scrotal and Inguinal Hernias and [diseases] of the Testicles," "On Precious Stones and their Medicinal Properties" and "Precise and Unmistakable Showings of Thunders and Earthquakes"), we can make definite conclusions about broad and all-encompassing scientific interests of Mkhitar Heratsi [8:2:129–138].

An excerpt from his famous book *Pathology*, that deals with the anatomy of the eye, is of a great scientific value. This book was still around as late as 1625, at which time, while reviewing the book *Anatomy*, by Abu Said (who was a Heratsi's contemporary), a distinguished physician, Asar Sebastatsi, added to Abu Said's section on the anatomy of the eye several chapters from Heratsi's "Pathology." Along with the description of eye anatomy, its membranes, 'moistures,' and functions, Heratsi paid a great deal of attention to pathological processes such as trachoma, keratitis, glaucoma and strabismus. Heratsi recommended an early pharmacological treatment of keratitis to prevent the spread of ulcers that may lead to blindness. "When a tumor appears in [the cornea], then if it appears in the upper stratum, it matures quickly and quickly bursts, and the scar [tissue] that forms in [the cornea] will be soft and will not be blinding white, and will be responsive to medication. [But] if the tumor penetrates into the second stratum of [the cornea], then it matures later and bursts later, and the scar [tissue] that forms in [the cornea] will be denser and will be of white color, and will slowly respond to medication. And if tumor

penetrates into the third stratum of [the cornea], then it matures slowly, and the scar [tissue] that forms in [the cornea] will be thicker and denser and [will be of] blinding white color, and will not respond to medication at all" [29:92].

One of the earliest descriptions of trachoma in Armenian ophthalmology belongs to Mkhitar Heratsi. The pathological changes in the conjunctiva, characteristic of trachoma, did not escape his attention. Among other methods for treatment of trachoma, Mkhitar also recommended the method of expression of follicles. "Since it (conjunctiva) is a body [with a] rough [surface], it can be punctured [easily] without caring about the fluid [that comes out of it] which is named *kamsh* (inflammatory matter), and an eye opens upon God's will" [29:93]. The Greek name for trachoma is related to a concept of 'roughness,' *trachys*. Mkhitar Heratsi contributed much to the development of biomedical terminology, creating new terms based upon Armenian words modeled after Greco-Latin and Arabo-Persian terminology.

During the decade that followed 1180, Mkhitar Heratsi began his major work, *Consolation for Fevers*. Materials for this book were gathered over many years, not only by studying works of ancient and Arabic physicians, but also by visiting remote swampy areas of the Cilician plain, where malaria and other fevers were rampant. It is well known that the fevers that killed many of the famous people of the time also cut short the life of Heratsi's friend and patron Nerses Shnorhali [30]. It is not surprising that Mkhitar Heratsi's research was of great interest to everybody concerned about the country's well-being and, especially, to the Catholicos Grigor Tgha (r. 1173–1193), Nerses Shnorhali's successor, a poet and philosopher, to whom *Consolation for Fevers* was dedicated. "I wished, for as much as my strength would allow me, to write this book concisely, and only about three kinds of fevers [along with their] prognosis and treatment . . . ," wrote Mkhitar in the foreword, "and we called it *Consolation for Fevers* because it consoles the physician with augmentation of knowledge, and the sick with recovery" [22:68].

Understanding that his book should be accessible for the broad audience, Mkhitar Heratsi decided against writing it in the Classical Armenian language, *Grabar*, so the book was written in colloquial Middle Armenian language of Cilician Armenia. Therefore "Great

Mkhitar," as he was called by many generations of Armenian physicians, created an opportunity for democratization of science. *Consolation for Fevers* came out in momentous 1184, when in indigenous Armenia, another Mkhitar, Mkhitar Gosh, created his famous *Code of Law*. Both of these books, written by scholar-humanitarians, had an enormous influence on progressive thinkers of the time.

Consolation for Fevers is dedicated to the etiology, pathogenesis, clinical symptomology, classification and treatment of infectious and allergic diseases. Based upon specifics of etiopathogenesis, the author divided fevers into three major groups: 'one-day fevers,' 'wasting fevers,' and 'moldy fevers.'

Under 'one-day fevers,' Heratsi described a whole array of fevers that appear as a result of the action upon the human soul or vital pneuma of various detrimental factors, such as gloom, sorrow, troubles, insomnia, exhaustion, heat, cold, bathing in sulfurous or alum water, overeating or undereating. Clinical symptoms of 'one-day fevers' are of fleeting character and include high temperature, various skin apparitions (redness, swelling, sometimes rash), changes in urine color and elevated pulse. Analysis of these symptoms from the point of view of contemporary medicine indicates that by 'one-day fevers' the Armenian *Bzhshkapet* described certain forms of allergic diseases (physical, chemical, food- and neuro-psychological allergies).

In 'wasting fevers,' Mkhitar Heratsi included various forms of tuberculosis: pulmonary, osseo-articular and intestinal diseases. Among factors that cause 'wasting fevers' he identified the same deleterious external and internal factors responsible for 'one-day fevers'; however, due to their prolonged action, not only do they affect pneuma, but they also invade dense parts of the body (bones, joints) and internal organs. It is important that the medieval Armenian *Bzhshkapet*, while distinguishing between 'wasting fevers' and 'one-day fevers,' to a certain degree pointed out the importance of allergic reactions in the development of tuberculosis.

'Moldy fevers' comprise the largest group in Mkhitar's classification. These are diseases characterized by the 'moldy' factor penetrating into cardinal moistures of the body: blood, black and yellow bile, and mucus. Various forms of malaria (three- and four-day), abdominal and exanthematic typhus, smallpox, measles, erysipelas, as

well as phlegmone were put into this group by Mkhitar. Armenian *Bzhshkapet* did not agree with traditional views of medieval science as far as origins of 'moldy fevers' were concerned.

In ancient medicine, fevers were customarily divided into two major categories: 'one-day fevers' and 'putrid fevers.' 'Wasting fevers' were included in the last group. This classification, attributed to Galen, was later accepted by Ibn Sina who considered that in the origin of 'putrid fevers' there lies a process of putrefaction. "Putrefaction appears," wrote Ibn Sina in the fourth book of his *Canon*, "due to bad nutrients, when [things] which originate from [nutrients] are predisposed to putrefaction because of the bad quality of their substance or the ability to undergo spoiling. . . . External conditions such as pestilent air, or air of lowlands and bogs, could also be responsible for putrid fever" [11:4:35].

In the section, "On Care and Treatment of Continued[9] Fever, that originates from blood and is of three kinds," Mkhitar Heratsi referred to Ibn Sina while reviewing causes of 'molding': "Sina's son presented the same causes of [fevers], i.e., that the cause of blood molding depends on plethora or venous thrombosis or long walking and forceful bodily movements" [22:138]. However, in the above-mentioned chapter of *Canon* dedicated to "Blood Fever," there is no mention about molding. Here, Ibn Sina only assumed that the cause of blood fevers could be not only putrefaction but also fermentation.

"Let's say now," he wrote, "that blood fever is, as a matter of fact, [not one but] two kinds of fevers: fever from putrefaction, and fever from heating and fermentation. . . It belongs to a kind of fever that could be put in between putrid and one-day fevers, and is different from one-day fevers by the fact that juices heat up first during this kind of fever, and it differs from putrid fevers by the absence of putrefaction" [11:4:80]. Therefore, Ibn Sina allowed for existence of other factors, apart from putrefaction, which was later elaborated by Mkhitar Heratsi, who proposed the hypothesis about the 'mold' factor. "It is an objective and undeniable fact that none of the physicians of prebacteriological era used a term for an infectious process, as meaningful and real, as did Mkhitar Heratsi" [8:2:121]. Views expressed by Mkhitar Heratsi were later developed by medieval

9. Lat. *febris continua.*

Armenian natural historians and physicians, as well as by Amirdovlat Amasiatsi.

Mkhitar Heratsi paid a great deal of attention to 'moldy' factors in the etiology of not only infectious diseases but also of malignant tumors. In the book *Consolation for Fevers* he wrote: "If black bile is becoming moldy in one part of the body, i.e., in one organ, then there appears the disease that Arabs call *saratan*, and Greeks call *karkinos*, which means cancer" [22:180]. In the light of contemporary medical knowledge about the viral origin of some tumors in humans and animals, these views of Heratsi are of significant value.

The Armenian *Bzhshkapet* was also aware about the contagious nature of 'mold fevers,' so he warned people to abstain from contact with the diseased. Disease, in his opinion, could be transmitted through sick animals as well. Prescribing donkey milk for 'wasting fevers,' he warned: "Beware that a donkey should be [of] white [color], healthy and free of all kinds of diseases" [22:109].

Phytotherapy played a major role in the system of medicinal treatment of diseases developed by the Armenian *Bzhshkapet*. Among medicinal plants recommended by him, species with antiallergic, antiinflammatory and antibacterial properties are especially abundant. Such plants as Chamomile,[10] Marjoram,[11] Yellow Cow Lily,[12] Violet,[13] Iris,[14] Mullein,[15] Hyssop,[16] Elecampane,[17] Wormwood,[18] Plantain,[19] Orcanet,[20] Licorice,[21] Meadow Saffron,[22] Caper Bush,[23] Mint,[24]

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10. *Matricaria sp.*
11. *Majorana sp.*
12. *Nuphar sp.*
13. *Viola sp.*
14. *Iris sp.*
15. *Verbascum sp.*
16. *Hyssopus officinalis* L.
17. *Inula helenium* L.
18. *Artemisia sp.*
19. *Plantago major* L.
20. Orcanet or Alkanet = *Anchusa sp.*
21. *Glycyrrhiza glabra* L.

Caltrops,[25] as well as some other wild and cultivated plants of Armenia, are often present in complex prescriptions provided in the book *Consolation for Fevers*. These plants were often prescribed for internal use as infusions, decoctions, tablets, powders, pills, syrups and porridges, as well as for external use as ointments, poultices and plasters. Oils of Violet, Rose, Yellow Cow Lily, Water Lily,[26] and Chamomile were used as rubbings, while their infusions were recommended for inhalations as well as washes and baths.

Mkhitar Heratsi also paid attention to medicinal diets. To patients sick with 'one-day fevers' he prescribed a light and moderate diet, for example, boiled chicken, partridge and pheasant meat with light seasonings, the juice of sour and sweet Pomegranates, Pumpkin pottage with juice of unripe Grapes, fresh fish fried with Almond oil, etc. To patients suffering from tuberculosis he recommended goat and sheep milk, cow buttermilk, boiled Purslane,[27] Pumpkin, Orache,[28] Beans,[29] with Almond oil, as well as Apple, Quince,[30] and Pomegranate juice. To weakened patients, specially prepared meat juice, chicken meat and fresh trout[31] was especially recommended.

Mkhitar Heratsi also advised psychotherapeutic methods of treatment, especially for patients suffering from 'one-day fevers,' that "are caused by grief and troubles." He wrote: "The treatment is: entertain [the patient] with games and jokes, and bring him happiness by all [available] means. Let him listen as much as possible to *gousans*[32] and sounds of strings and pleasant melodies. Let him be occupied with

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22. *Colchicum autumnale* L.
23. *Capparis spinosa* L.
24. *Mentha sp.*
25. *Tribulus sp.*
26. *Nymphaea sp.*
27. *Portulaca sp.*
28. *Atriplex sp.*
29. *Phaseolus sp.*
30. *Cydonia sp.*
31. *Salmo sp.*
32. Folk singers.

deeds that will bring him internal happiness" [22:87]. As it can easily be seen, a system of Heratsi's psychotherapeutic treatment, including methods of treatment with music, borrowed from folk medicine, is, without a doubt, a very rational and helpful one.

Mkhitar Heratsi, who creatively approached many therapeutic methods of the folk medicine and expressed a novel hypothesis about the origins of malignant tumors and infectious and allergic diseases, was one of the leading representatives of the medieval science. One of the renowned scholars of Heratsi's heritage, Ernst Seidel, praised his accomplishments highly: "When we compare without prejudice the work of our Armenian master with *Physics* by Hildergard that was published several decades earlier, we must decisively give the former priority for all-encompassing knowledge of nature, consistent original thinking and complete freedom from scholastic *kabala*" [31:iv].

The most ancient scribal copy of the book *Consolation for Fevers*, dated in the year 1279, is held and preserved at the Mashtots Matenadaran. A copy held at the National Library of Paris belongs to a much later period (seventeenth century). Its text was published in 1832 by Venetian *Mkhitarists*, while in 1907 it was brilliantly translated into German by Ernst Seidel, and awarded a Puschmann prize. An important milestone in *mkhitarology* was the translation of the book *Consolation for Fevers* into Russian, undertaken by a group of historians of Armenian medicine under the supervision of L. A. Hovhannisian in 1955. Apart from two manuscripts containing the complete text of *Consolation for Fevers*, there also exists an abridged version of the text included in Gagik's *Bzhshkaran.* Therefore, the destiny of the book *Consolation for Fevers* was closely interwoven with this famous medieval *Bzhshkaran* throughout history.

Now let's return to the discussion of Gagik's *Bzhshkaran* that, according to V. Torgomian, was "a patriarch of our medicinal literature." By the same route that led oppressed Armenians from native Armenia into Cilicia, Gagik's *Bzhshkaran* traveled from Ani. There it underwent a serious revision and was extended to contain two new chapters: an abridged version of the book *Consolation for Fevers* and a *Bzhshkaran* by an anonymous author, and there it was first called Gagik-Hetum's *Bzhshkaran.* When this was done, and by whom, is currently undecided. Some light on this problem is shed by colophons of manuscripts held at the library of the Armenian Patriarchate in

Jerusalem and at the library of the Venetian *Mkhitarists* [25]. The name of Hetum is mentioned there, but in the Jerusalem manuscript he is called "Hetum *Sebast*" (a title of an important Armenian feudal lord from Cilicia), "the son of Oshin," while in the Venetian manuscript there is mentioned "a man of royal stock, owner of Korikos, the great *sebast*." These discrepancies allow us to make an assumption that two different representatives of the Hetum family are mentioned here. The Hetum mentioned in the Jerusalem manuscript is an elder brother of a famous medieval scientist Nerses Lambronatsi [32]. A contemporary of Mkhitar Heratsi, he became a *sebast* after the death of his fater Oshin, and ruled Lambron up to 1201, when he was stripped of his family name for recalcitrance by Levon the Second, and then entered a monastery under the name Heghi. Not only was the manuscript made to his order, but he also took an active part in its revision. He could have been able to complete this work no earlier than 1184, when Mkhitar Heratsi's work was written, but also no later than 1201, for he was still named *sebast* at the time.

Therefore, Gagik's *Bzhshkaran* was revised during Mkhitar Heratsi's lifetime, and the editor included in it 30 chapters from the book *Consolation for Fevers* dedicated to 'wasting fevers' and 'mold fevers,' while omitting sixteen opening chapters on 'one-day fevers.' Being an expert in medical arts, the editor understood that 'one-day fevers' differ greatly from contagious 'wasting' and 'mold' fevers, and thought it possible to omit them.

As far as the identity of the second Hetum is concerned, his title of "the great *sebast*, owner of Korikos," as well as an indication that he was of royal stock, point to the fact that he was Hetum the historian, a relative of the King Hetum (incidentally, this Hetum also became a monk and entered a monastery on Cyprus in 1305) [33:667–674]. Therefore, a hundred years after Gagik-Hetum's *Bzhshkaran* was compiled by Hetum Lambronatsi, yet another representative of Hetumids, Hetum the historian, who was unsatisfied by the condition of the paper manuscript, ordered the elder Vard Mrtishetsi to copy the book onto parchment. Thus Hetum the historian did a great favor to medieval Armenian medicine, by preserving its splendid artifact for posterity.

The third part of Gagik-Hetum's *Bzhshkaran* dealt with various aspects of aethiopathogenesis and the treatment of all diseases known

at the time. It was without doubt already created at the time of Cilician medicinal school, for unlike the first part, which was written in the Ani period and influenced by ancient science, it contained references not only on Hippocrates, Aristotle, Galen, but also on Rhazes, Ibn Sina and other eastern authors. Gagik-Hetum's *Bzhshkaran* could be proudly called an encyclopedia of medieval Armenian medicine and natural science. To a certain degree, various works included in it compensated for the loss of Heratsi's *Pathology* and *Akhrabadin*, and there even existed a theory that Heratsi was indeed the author of these works [34].

Gagik-Hetum's *Bzhshkaran* has its presence in many specialized works on pharmacology and clinical medicine. It also greatly influenced general development of medieval Armenian medicine. For example, in the volume of collected works on medicine, Ms. #8382 from the Mashtots Matenadaran, there are assembled four *Bzhshkarans* dated in the fourteenth century, the first and fourth of which have chapters on pharmacology undoubtedly written under the influence of Gagik-Hetum's *Bzhshkaran* [35].

Even at later times authors occasionally included in their works revised and altered chapters from this famous *Bzhshkaran.* For example, in the *Bzhshkaran of the Physician Hovhannes* written in 1438, there are thirty-nine chapters on pharmacology, prognostics and clinical medicine from Gagik-Hetum's *Bzhshkaran* [35]. Therefore, even twenty years before any works of Amirdovlat Amasiatsi were written, the authority of this book was so great that medieval Armenian physicians and natural historians customarily borrowed data from it that had to do with pharmacognosy and methods of treatment.

Besides the abovementioned *Bzhshkarans*, in which data on simple and complex medications were not yet distinguished, starting from the twelfth century a new kind of works appear in Armenia, dedicated strictly to simple or complex medications that corresponded to eastern *mufradats* and *akhrabadins.* At the same time works on clinical medicine were segregated. A similar trend was clearly visible in the works of "the great Mkhitar" (for example his *Pathology* and *Akhrabadin*). His follower, Grigoris, from the Cilician school (thirteenth century), had the same tendency. In his book *Analysis of Man's Nature and his Ailments*, on the basis of the data he collected himself, Grigoris studied problems of aethiopathogenesis, clinical symptomatology and prognostics, describing at length various fevers

and other internal diseases. Grigoris's classification of fevers is very much similar to Mkhitar's. Following Heratsi in the way he viewed the 'mold' factor, he tried to elucidate the true nature of this phenomenon as well as circumstances that lead to its activation. Grigoris wrote: "There are five causes of the molding of moistures: their excess, thickness and uniformity, and pollution of vessels, and upsetting of their breathing because of the pollution" [36:16]. Grigoris applied the 'mold' factor hypothesis not only to 'wasting fevers' but also to diseases of internal organs and eyes. While continuing his studies on the contagious nature of 'mold' fevers he wrote the following on tuberculosis: "This illness affects those who approach the sick, especially if it is summer time and the place is [crowded]" [36:114]. Just like Mkhitar Heratsi, Grigoris explained origins of tumors by the action of the 'mold' factor. But the essence of the tumor formation process is analyzed by Grigoris in far greater details than in the book *Consolation for Fevers*.

Factors contributing to tumor formation, (chemical and physical agents, psychiatric trauma), as well as peculiarities of their clinical development that are often accompanied by ulcer formation, did not escape Grigoris's scrutiny. Grigoris described clinical symptoms of malignant tumors of the eyes, esophagus, digestive tract, liver and womb. Concerning a malignant tumor of the womb of the *sykarros* type, he wrote that it is characterized by a rapid growth of the tumor, leading to the displacement of body cavity organs, development of ascitis, pain in remote organs, especially in extremities, and paralysis. Equally detailed is the description of the malignant tumor of the eyes, where along with local symptoms, Grigoris also pointed out metastases formation processes. "When this ailment affects this membrane [of the eye]," wrote Grigoris, "then the eye hurts and reddens, and itches, and [pain] radiates into the temples, especially while moving. And this ailment is accompanied by headaches and nausea" [36:80].

Grigoris also developed yet another one of Heratsi's theses—the necessity to study an anatomical substratum of disease—thereby becoming a pioneer of pathologo-anatomical research in medieval Armenian medicine. Descriptions of diseases of lungs, heart and stomach in the book *Analysis of Man's Nature and his Ailments*, point to the fact that on some occasions its author used materials from post-mortem dissections. In the case of tuberculosis he described 'nodules,'

'ulcers,' as well as so-called 'stones,' that correspond to a concept of tuberculous nodules, infiltrates, caverns and calcification foci in contemporary medicine. Descriptions of pathological foci in lungs in cases of abscesses and echinococcus are also of great interest. In general, Grigoris has proven to be an incisive physician and explorer of nature, who was instrumental in bringing the science of clinical medicine one step higher than his predecessors.

In the same collection containing the *Analysis of Man's Nature and his Ailments*, there is also a book named *Akhrabadin*, about which the historian of Armenian medicine A. S. Ktsoyan wrote that despite some differences in language and terminology, both works belong to the same author—Grigoris [36:xxii]. He also pointed out yet another distinction between these works: while in the first one, only ancient authors are cited (e.g., Hippocrates, Galen, Dioscorides, etc.), in the *Akhrabadin* there are a multitude of references to eastern pharmacopoeias, especially in the *Canon* by Ibn Sina. The latter is not surprising, for all medieval Armenian *akhrabadins* invariably followed the eastern tradition. In twenty chapters, this work gives a description of complex medicinal mixtures and means of preparing thereof. Despite the fact that some of the prescriptions in *Akhrabadin* are also present in Gagik-Hetum's *Bzhshkaran,* for example tablets made from Spurge Olive[33] leaves, Quince[34] syrup, etc. [37, folio 18b], but in general, the two books differ substantially. The author of the *Akhrabadin* was undoubtedly familiar with the pharmacology of Ani, but, following Mkhitar Heratsi's steps and the traditions of the Cilician school, he separately described complex medicines, adding his experience in the field to the data of other authoritative sources.

While inheriting a multitude of works on medicine from medieval Armenian physicians and natural historians that lived before him, Amirdovlat Amasiatsi critically reviewed these works, choosing a difficult path of independent research, characteristic of the Great Mkhitar and his disciples.

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33. *Daphne mezereum* L.

34. *Cydonia oblonga* Mill.

Life and Work of Amirdovlat Amasiatsi

The fifteenth century—the time during which Amirdovlat Amasiatsi lived and worked—was one of the darkest eras in the history of the Armenian people. The previous century was also full of heavy losses, the destruction of the Armenian State and the fall of the Cilician Armenian Kingdom (1375). The country was just recovering from wounds inflicted by Timur's hordes (1386–1387, 1396, 1399–1403), when it became an arena for two competing Turkmen tribes: Kara-Koyunlu and Ak-Koyunlu ("Black Goats" and "White Goats"). Ottoman Turkey, which had recovered from a defeat at Ankara (1402), also joined the struggle in the second part of the fifteenth century. Half a century (1410–1468) of domination of the nomadic tribe Kara-Koyunlu over Armenian soil had changed to domination of the White Goats, the Ak-Koyunlu. The ruler of the White Goats, Uzun-Hasan, unsuccessfully tried to curb the advance of the Ottoman Empire by joining an anti-Ottoman league of European states [38:49]. Uzun-Hasan's campaign against the Turks began in 1472, when an Ak-Koyunlu army of one hundred thousand-strong destroyed the ancient Armenian city of Yerzinka, entered Tokhat, and later marched to Karamania. But Muhammed II Fatih ('The Conqueror') did not take long to retaliate. War ended in total defeat of Uzun-Hasan in 1473.

The continuous warfare undermined the country's economy, already overburdened by taxation put on its people by nomadic tribes. Famine and mass pestilence had swept across the country. In addition, everything that escaped looting by hordes of enemy soldiers, fell prey to infestations of locusts, which from 1419 started to regularly appear in various regions of Armenia. Not surprisingly, prophecies about a coming end of the world were common at the time [39]. A pitiful picture of human suffering was described in the works of many chroniclers, historians and poets of the time: Tovma Metsopetsi, Grigor Khlatetsi, Arakel Siunetsi, Arakel Baghishetsi and Mkrtich Naghash, in Armenian manuscripts and folk songs, in which the sorrowful "song of the wanderer"—the wail of thousands of people forced away from their

motherland—was starting to appear more and more often [38:491–492, 517–525].

"Despite these difficult conditions," writes L. A. Hovhannisian, "somewhere out there, behind thick monastery walls, there survived some remainders of the free creative thought. Even in the most bleak periods of tyranny and ignorance, the continuity of the cultural tradition was not disrupted" [8:3:1]. Many medieval academies continued to function at such monastic centers, especially Tatev University, in which famous Iohann Vorotnetsi, Grigor Tatevatsi and their students continued to research various problems of philosophy, natural history and medicine. Characteristic of these scientists, philosophical nominalism and sensualism gave them a possibility to abandon old scholastic tradition and begin experimental search for truth [38:474]. An especially splendid representative of this tendency was Grigor Tatevatsi (1346–1409), who daringly overcame limitations of medieval scholastic thought in his *Book of Questions.* His equally bright student Matevos Djugayetsi later continued his teacher's work on evolutionary development of the animal world [39]. The Sebastian school of medicine in Minor Armenia, known for its contacts with adjacent Armenian centers in Tokhat, Marzvan and Amasia, had also shown a great deal of creative activity in these difficult times. At that school Amirdovlat Amasiatsi had made his first steps in science, and there many of his works were later preserved, studied and reviewed [8:3:113–126].

The ancient city of Amasia, capital of the Pontic Kingdom and during Justinian's rule the capital of Armenia Minor, was also the city where Amirdovlat Amasiatsi was born. Amasia is often mentioned in books on Armenian history. In 1064 it became a dominion of King Gagik from the dynasty of the Kars Bagratids. Despite the fact that by the fifteenth century Amasia had lost most of its splendor, it still continued to be a center of a large province of Ottoman Turkey. Up until a bloody event of the Armenian genocide in 1915, several thousands of Armenians lived there, and a prosperous Armenian community thrived, with many schools, hospitals and churches [40:42; 41:39–67; 42:55–57, 309–332].

By the end of the second decade[1] of the fifteenth century, in Amasia, in the family of an Armenian named Yeghia, the future *bzhshkapet* Amirdovlat was born. No information exists nowadays about his first steps in science, nor about his teachers or tutors. There was an abundance of pedagogues in Armenia at the time, especially in the neighboring Sebastia, where the famous medical dynasties of the Hekimyans and Asaryans originated. We will never know what exactly made young Amirdovlat leave his motherland, whether it was war, state policies of forced migrations, or quest for knowledge. By the end of 1450s, after wandering a great deal, he found himself in Constantinople. "And we traveled a great deal around many cities [of Armenia and Iran]," he wrote, "and then crossed the sea, traveled around Macedonia, and settled down in the capital city of Constantinople" [43:3]. There he completed his education under the guidance of many experienced physicians, obtained the degree of *bzhshkapet*, and in 1459 created his first work, *The Lore of Medicine*, written upon the request of Vard, son of Shadi-bek.

By that time Constantinople had been the capital city of Ottoman Turkey for six years. In 1453, Mohammed II took a long-awaited possession of the splendid capital city of Byzantine emperors, which had been looted and then abandoned. He tried to restore its lost splendor, forcing Christian artisans, including many Armenians, to live there [38:301]. Historians depict him as a ruthless and controversial despot, for whom human life had no value, but, who at the same time possessed a statesman's mind, created a code of laws named *Qanun-name*, and was a well known patron of the arts [44:3:325–335]. He surrounded himself with poets and philosophers, and even is said to had tried his poetic abilities. The future sultan spend his childhood and adolescent years in Amasia. So, it was not surprising that when Mohammed II moved to Constantinople, a young physician from Amasia, who had already won popularity in the capital as an expert

1. Since the exact birth date of Amirdovlat Amasiatsi is unknown, some scholars refer to it as 1414–1419 (S. Malkhasyants), while others suggest 1420–1425 (L. A. Hovhannisian). By taking into consideration that the first work of Amasiatsi was written in 1459, when he could not have been more than 30 years old, we think he was most probably born in the end of the second, or even in the beginning of the third decade of the fifteenth century.

healer, astronomer, philosopher and a poet, became one of the members of his court. Mohammed II made Amirdovlat his chief eye surgeon—'charah-pashi ramatanin'.[2] Manuscript #247 of the National Library of Paris contains a work by Amasiatsi, *On Disease Symptoms [that Predict] Convalescence or Death.* In a colophon to this work the author writes: "And [please] mention me, *charah-pashi* (the chief surgeon) and *postanchi-pashi* (chief of bodyguards), before the face of God" [45].

Such a fast advancement of a Christian physician at the court of the Muslim Sultan naturally provoked jealousy and intrigues that caused an almost ten-year-long exile of Amirdovlat Amasiatsi from Constantinople, and his wanderings around the countries of the Balkan Peninsula. In the foreword to his all-encompassing work, *Benefits of Medicine* that was written in 1469 in the city of Phillipopolis (nowadays Plovdiv, Bulgaria), the Armenian *bzhshkapet* recalls the tough times: "I endured many hardships and accidents from impious people, foreigners, judges, kings and princes. I collected many books: Arabic, Persian and Turkish. I lived in a foreign land for a long time. During this time I endured good and bad, and adventures, richness and poverty. In many countries I practiced the art of medicine and tried at my discretion many drugs and complex prescriptions; served many patients: people of high standing and princes, *hariurapets* and *hazarapets*,[3] urban dwellers and poor people, adults and children. I have seen a lot of good and evil, and now I have reached such a condition that I will neither rejoice at my wealth nor grieve over my poverty" [46:7].

Years of travel enriched Amirdovlat Amasiatsi with the many invaluable experiences of a traveling physician-periodeuta, as well as broaden his knowledge of medicinal plants of the countries he visited. During these years he gathered and studied the healing herbs of the

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2. Historians of Armenian medicine [8:3:20] interpret the word *ramatanin* as an honorable name for Amasiatsi, however, in our view, it represents a borrowed form of and Arabic term *ramdan*, i.e., the one who suffers from eye diseases, used in the singular number of the genitive case of the Classical Armenian language.

3. *Hariurapet*—a commander of a 100-man military detachment; *hazarapet*—a commander of a 1,000-man military detachment.

Balkan peninsula, Asia Minor, Armenia and Iran. In 1466–1467 the Black Death epidemic broke out in the countries of the Balkan peninsula and even in the capital city of Constantinople itself. Mohammed II took a refuge from the plagued capital in places with healthier climate (the cities of Vidin and Nicopole) [47]. Amirdovlat, who found himself right in the center of the epidemic, provided medical help to many suffering people, which he later described in his book *Benefits of Medicine.* In this book Amirdovlat summarized his experiences and observations on this horrifying disease, which before him was known in Armenian medical literature from books of Mkhitar Heratsi.

The horror experienced by Mohammed II made him remember his disgraced physician and called him back to serve at Mohammed's court. In the beginning of the seventh decade of the fifteenth century Amirdovlat came back to Constantinople. He managed again to win the trust of the frightful Sultan and restore his position of chief-physician. According to some data, Amirdovlat used his influence, which grew even higher after his return to Mohammed's court, to help Armenian people to preserve cultural treasures, especially manuscripts. In a colophon to the Armenian Psalm book, written in 1480 in Constantinople, a scribe named Martiros wrote: "When the Great Ruler Sultan Mohammed undertook the campaign against Uzun-Hasan and beat him and put him to flight, [the latter] escaped to Tabriz, and on his (Sultan's) way back [the Sultan] entered the region [named] Khakhteats, destroyed the city of Baberd, and took hostage and brought back to Stambul an excellent Psalter. Amirdovlat saw it and freed the Holy Book from captivity. This happened in the year 922 (1473)" [48]. Later Amirdovlat gave the Psalter to the above-mentioned Martiros to make a hand-written copy, which after four centuries ended up in the hands of the historian of Armenian medicine V. Torgomian, who discovered from the colophon in the book new biographic facts about Amirdovlat.

The scribe Martiros was one of many Armenian artisans who were forced to move to Constantinople from Amasia, Erzurum, Baberd, Yerzinka, Sebastia, Diyarbekir and some other Armenian cities during the rule of Mohammed II [38: 289]. Martiros wrote the following about himself in the same colophon to the Armenian Psalm book: "In the year 928 (1479) the Ruler evicted [many] Armenians from Karamani area,

and me, worthless Martiros, the dust [at your feet], they brought to Constantinople and made an apprentice to the holy *vardapet*[4] Ter-Mateos Sebastatsi and the *vardapet* Abraham Trapizonetsi, who were also brought [to Constantinople] by the Ruler, and [the Ruler] designated [them] as Patriarchs, but they refused, choosing monastic life over the glory from the hand of a man" [49:2:276]. In the next year the young exile Martiros, complaining about "bitter and difficult times," got his first assignment from Amirdovlat Amasiatsi—"the great scientist and quick-to-help physician, who made his name glorious by his deeds, for he does not have any rest day or night, having achieved that which is unattainable [to others]" [49:2:276].

The thirst for knowledge and love for Armenian books and ancient manuscripts were a characteristic feature of Amirdovlat's scientific personality. His main pharmacological work was meaningfully named *Useless for Ignoramuses*. He lovingly hand copied all of his works himself. Two surviving autographs of his first works, *The Lore of Medicine* and *Akhrabadin* are written in 1459 in clear and refined *notrgir*[5] of the author.

But if Amirdovlat could not attend to hand-copying his books himself, mainly because of being busy, he would usually select not the scribes grown wise with experience but humble novices, often his compatriots, grief-stricken vagabonds, whom he tried to help and encourage as much as possible. While working on *Useless for Ignoramuses* in Constantinople, he assigned the scribe named Nerses to copy *The Chronicle* by Michael the Syrian, as well as another work with the same name by Samuel Anetsi, for "personal pleasure and for the fine young son Amiretil." In a colophon in manuscript 313 in the library of the Armenian Patriarchy in Jerusalem, it is said: "This historical book is written in the year 929 (1480) of Armenian chronology[6] in the Byzantine city that is now called Constantinople, by the hand of the sinful and unskilled scribe and unworthy priest Nerses during the harsh times of the rule of the Sultan Mahmat, which

4. *Vardapet* = monk-scholar.

5. A style of calligraphic handwriting.

6. The Great Armenian chronology was founded in the year 552, therefore, the year 929 of Armenian chronology corresponds to the year 1480 (929+551=1480) [50:369].

brought many [hardships] upon Christians and his own people, [who] had driven [people] away and moved [people] from place to place, demanding tax money as well as causing other oppressions. At present, lying prone, I implore anyone who would read this manuscript or copy it, to remember me, devoid of any virtues, in his holiest of prayers, and if any errors are to be found in it (manuscript), may he not lament over this, for I have been writing this [manuscript] in a great sorrow, for we all were brought forcefully to Constantinople from Amasia" [49:2:443].

It was not accidental that Amirdovlat Amasiatsi has chosen the above-mentioned works for the education of his own son. In the years of trials and tribulations he often turned his attention to the glorious past of his people, to the history of the Ani kingdom and Cilician Armenia. Having this in mind, Amirdovlat in 1481 gave scribe Astvatsatur an order for making a copy of the book *On Soul and Moral Strength*. And ten years later, after returning to his native city of Amasia, Amirdovlat ordered from the scribe Andreas philosophical works of Grigor Tatevatsi and Iohann Vorotnetsi, which were commentaries to works of Aristotle and Porphirius. In a colophon to the manuscript, the scribe Andreas stated that "this book was copied according to the will and agreement of the physician Amirdovlat, who is, because of his bibliophily, [like] a second Ptolemy in our time" [49:3:188].

Amirdovlat returned to his motherland only after the death of Mohammed II. In the book *Useless for Ignoramuses* the author brings forward interesting facts on the Sultan's last years, during which the Sultan suffered from a severe case of gout[7] [51:77]. "In the year 929 of the Armenian chronology [1480 C.E.]," wrote Amirdovlat, "during the reign of Muhamat-khan, who had taken the imperial throne in Constantinople, discussions began about the seal-clay,[8] and about [the

7. Lat. *podagra*.

8. Seal-clay or Lemnos clay (Lat. *terra sigillata* syn. *terra lemnia*)—this type of clay was mined at the island of Lemnos in Aegean Sea. It got its name from the seal on which, according to some sources, the head of the goddess Artemis was depicted and, according to other sources the head of a goat. Its chemical composition resembles that of ochre, with which it was often confused. It contains alumosilicates and iron hydroxide. Armenian clay or bole is close to seal-clay in composition, but it is richer in iron and its color is dark-red,

fact that] there is a need to find that [clay]. And a physician from the Saracen tribe was sent to that island, which is called Lemnos, so he (physician) could find that place, where the seal-clay deposits are. He went, but did not find the clay, and has taken some of the other kind, which faded[9], and brought it to the Sultan. And physicians saw [the clay], but did not accept it [as seal-clay]" [43:126].

After the first unsuccessful expedition, another was sent to Lemnos, with three physicians participating: a Greek, a Persian, and the third, who according to Amirdovlat was "from those lands, where the art of artistic depiction is mastered," and who was in all probability an Italian. Members of the expedition were rather observant, and their efforts paid off. Nevertheless, though Amirdovlat did not participate in either of the expeditions, he still was very much interested in their results, and it is thanks to him that we have a description of these trips and a detailed route of the trip, which in the past had been used by Galen on his way to Lemnos. The seal-clay did not, however, help the Sultan who, according to his chief-physician "died within a year, and a great upheaval started in Constantinople, and a fight for the throne." The latter words are testimonial to the fact that Amirdovlat was indeed a witness of the Janissary[10] uprising in Constantinople after the death of Mohammed II (1481), as well as the battle for power between Mohammed's two sons: Bayazid and Djem [44:3:337–374].

In the last years of his life, Amirdovlat Amasiatsi left Constantinople and returned to his motherland upon the invitation of Bayazid's son, Ahmed, who became the ruler of Amasia. Ahmed, just like his grandfather, Muhammed Fatih, highly praised the Armenian physician, and extended him a cordial welcome. The scribe Andreas wrote: "He was highly respected [among us], and afterwards left for Constantinople [to serve] the king named Mahmat-khan, and after his death, his grandson Ahmad sent for him, and brought him to the city of Amasia, where he was born, and received him with great love" [49:3:189]. Here the elderly and already sick Amirdovlat spent the rest

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whereas seal-clay has pink coloration. It is used in ancient and medieval medicine as an antitoxic, antiseptic and hemostatic medicine.

9. I.e., changed color after some time.

10. A soldier of an elite corps of Turkish troops organized in the fourteenth century and abolished in 1826.

of his life. Not long before his death (1490) he went for treatment to Bursa, a city about twenty kilometers from the Sea of Marmora, famous for its mineral water springs. The colophon to the most ancient manuscript of the book *Useless for Ignoramuses* informs us about the death of the *bzhshkapet* that followed on Thursday, December 8, 945 (1496) [52].

The long and fruitful life of the physician-humanist was full of heroic struggle, altruistic service to people regardless of their social status, the tireless search for medicinal plants and the study of their properties, the creation of scientific works and his collection of ancient Armenian manuscripts, many of which were thus saved from destruction. During the quarter of a century he wrote a whole library of works: in 1459—*The Lore of Medicine* and the first *Akhrabadin*, in 1466–1469—*Benefits of Medicine*, in 1481—the second *Akhrabadin* and in 1478–1482—*Useless for Ignoramuses*. Apart from that he also wrote the book *Folk Medicine* in 1474, which confirmed his reputation as an astronomer, in the sense the term was understood in medieval science, where astronomy and astrology were often closely interwoven [53].

Amirdovlat Amasiatsi was the teacher in the highest sense of the word. He created his works not only for the narrow circle of specialists, but also for a wide audience of people, still learning, young physicians and natural historians who were just taking their first steps in science. Elucidating the most difficult and entangled topics of medieval pharmacology he wrote: "And I, the unworthy servant of God, worked a lot in this art before I found all this, and double checked everything over and over again, so the [students] would be able to easily comprehend and understand this secret art" [43:11].

Amirdovlat expressed his thoughts not in Classical Armenian, the officially recognized language of science, but, following the democratic tradition of Mkhitar Heratsi, in the spoken language of the time, which he called "*ashkharabar*" (this later became the name for the contemporary Armenian literary language). "And let us also say why we wrote this book in *ashkharabar*. That is because of three reasons. The first [reason] is, because not everybody can read the ancient language or foreign writings, to understand all these sophisticated things. So, that is why we wrote [the book] in *ashkharabar*" [43:25]. Being written for the

learning audience, these works possess didactic character, which is also reflected in their names.

Since Amirdovlat also possessed a poetic talent, he often stuffed his works with poetic passages, verses and aphorisms, trying to convey his scientific ardor and thoughts to the reader in bright metaphoric form, encouraging their journey into the unknown. "Follow the path of learning, [oh reader!], or else you will become a physician-ignoramus"—Amirdovlat warned the negligent.

The wise *bzhshkapet* was also trying to awaken in his young readers the need for moral and spiritual improvement—the true source of strength and purity, which, according to Hippocrates, were necessary to everyone studying medicine. "A physician should be wise and filled with a sense of duty," taught Amirdovlat, "[he should also] be patient and ready to give an advice. He should under no circumstances be a drunkard, greedy, [or] mercenary minded person. He should like poor people, be merciful, dedicated, morally pure and a god-fearing man. Unless he comprehends what the true essence of disease is, he should not give any medication, lest his name would be sullied. And if he does not have an expertise [in medical science], then it is better not to call upon him to see a patient, and not to recognize him as a physician at all" [46:9]. Amirdovlat was invariably following these directions himself. All of his pupils (not only certain people who call themselves his pupils, but also the whole school of Sebastian physicians) piously followed Amirdovlat's precepts in medical practice and scientific research alike.

Amirdovlat Amasiatsi made a great contribution to medieval Armenian medicine. In his works, *Benefits of Medicine* and *Useless for Ignoramuses* he kept alive the medical tradition of Mkhitar Heratsi and the Cilician school of medicine, while revolutionizing certain areas of clinical medicine and pharmacotherapy of some diseases.

Apart from that, he also paid a lot of attention to problems of anatomy, physiology, embryology and hygiene, which he elaborated in his first major work, *The Lore of Medicine*. While comparing the chapter on anatomy in Amirdovlat's book with analogous works by Cilician school, it becomes obvious that great progress was made in this area of medicine, which found its expression in the more substantial descriptions of the anatomy of the sensory system, the brain and the osteoarticular and muscular systems. The chapter on eye anatomy in

The Lore of Medicine is closely related to a fragment by Mkhitar Heratsi *On Structure and Creation of the Eye*, where, apart from similar terminology, the same kind of approach was used to a whole array of important questions (classification of membranes, 'moistures,' and their spatial distribution in the eye, the essence of the vision process).

As far as eye ailments are concerned, Amirdovlat dedicated to them twenty chapters of the book *Benefits of Medicine.* Along with infectious diseases (conjunctivitis, blepharitis, keratitis) there is also described cataracts, glaucoma, and malignant tumor of the eye. Keeping with the traditions of Mkhitar Heratsi and Grigoris, in the chapter on trachoma, he presented an even more detailed description of trachoma's clinical symptomatology, paying special attention to complications that lead to a decrease of vision acuity, and which can ultimately cause blindness. Apart from a conservative therapy, Amirdovlat often recommended surgical procedures. In *Benefits of Medicine* he gave a description of surgical procedures used in cases of cataracts, complications of trachoma, pterygium, congenital malformations and some other eye diseases. It is worth mentioning that in early stages of cataracts development, the Armenian *bzhshkapet* recommended dietary and medicinal treatment, and only in cases of developed cataracts did he recommend surgical intervention. "It is necessary to puncture eye tissues, and insert a needle, and drain the [indurated] cataracts, and then, the eye will clear up and be cleansed, and when you make sure that all of the [cataracts] was drained, then lay a sleeping patient down on his back, put a plaster made of rose oil and egg yolk on his eyes, put a pillow under his head, and [secure the plaster with] a bandage. And let him remain in the dark room wearing the bandage for three days" [46:217].

In the book *Benefits of Medicine* the Armenian *bzhshkapet* spent some time discussing various questions of etiopathogenesis and the clinical picture and treatment of infectious and allergic ailments. The classification of fevers into 'wasting fevers,' 'mold fevers' and 'one-day fevers' was borrowed by him from Mkhitar Heratsi, as well as the concept of a role of the 'mold' factor in fever's origin. Amirdovlat did not originate anything appreciably new in this area in addition to the already existing doctrine of the Cilician school. One of his notable contributions was in the area of phytotherapy of infectious and allergic

ailments, which will be discussed in detail later in this book. It is important that in Amirdovlat's system of medicinal treatment of 'one-day fevers,' a great deal of attention was paid to natural and climatic factors. In the chapter named "[Concerning] one-day fevers, which originate from grief, tribulations and great sufferings," along with psychotherapeutic methods of treatment of psychogenic allergies, which were also used by Mkhitar Heratsi, Amirdovlat recommended salubrious sea air: "Its (fever's) treatment is a matter of calming the patient with songs of *gusans*, and taking him to the [sea] shore, to [the water] and greenery" [46:489].

Amirdovlat also recommended healthy natural and climatic conditions in conjunction with psychotherapeutic methods of treatment, in cases of nervous system disorders and psychiatric ailments. According to Amirdovlat, the treatment of a patient with manic-depressive psychosis ("love mania") consists of "charming his ear by delightful voices and pleasant speech, situating him among greenery and flowers, on the bank of the creek, so he can listen to birds singing and enjoy the fragrance of flowers" [46:157]. Amirdovlat dedicated to neuro-psychiatric ailments a total of thirty-two chapters of his book *Benefits of Medicine*, describing clinical symptomatology of a brain tumor, migraine, meningitis, hypertonic disease, arteriosclerosis, stroke, paralysis, seizures, epilepsy, schizophrenia and some other ailments. Here he was also following the footsteps of the Cilician school, which in its code of medicine named Gagik-Hetum's *Bzhshkaran*, also described clinical pictures of many of the above mentioned diseases. One of Amirdovlat's greatest achievements was further development of phytotherapy of neurological and mental ailments in his books, *Benefits of Medicine* and *Useless for Ignoramuses*.

Methods of medicinal and dietary treatment of diabetes in medieval Armenian medicine present special interest. A classical description of this disease can be found in Gagik-Hetum's *Bzhshkaran*: "A disease, called diabetes, originates in the kidneys. Its [symptoms] are as follows: a feeling of heat and thirst increases, and urine is excreted in great quantities, and its (urine's) color is similar to drinking water, and a person becomes emaciated" [25, folio 152a]. The main symptoms of the disease (thirst, copious urination and general emaciation) were known to Ibn Sina, who wrote in his *Canon*: "The cause of diabetes is in the

condition of kidneys" [11:3:2:339]. Despite the fact that there was certain confusion about the etiology of diabetes in medieval medicine, a rational system of medicinal and dietary treatment of this ailment was developed empirically. In Gagik-Hetum's *Bzhshkaran* the following recommendations are given: "[A person] suffering from this ailment should be limited in the amount of water and food [he consumes]. Let him eat Red Millet and Barley, and drink Barley water. And instead of water let him drink the juice of the Pumpkin, Pomegranate, Plum, Barberry and Quince." Cow buttermilk with fresh Coriander was also recommended for drinking. In addition to that Amirdovlat recommended Lettuce and Chicory, and seeds of Parsley, Fennel, Purslane, Cucumber, Watermelon and Melon. [46:386].

The problem of malignant tumors found its place in Amirdovlat's work as well. Amirdovlat shared the view of Mkhitar Heratsi and the Cilician school on the origins of cancer, which was, in Amirdovlat's opinion, characterized by "swift and incessant growth," eventually leading to the emaciation of a human organism called 'cachexia' [46:474]. Amirdovlat's description of the clinical picture of cervical erosion, which, in his opinion, precedes cancer development, and which is often linked to birth trauma, is of paramount importance for in-depth evaluation of the Armenian *bzhshkapet*'s understanding of the nature of the cancerogenic processes. "[One of the] signs of the erosion is purulent discharges and pain, and if one [would] open the womb, and look inside, [one would see] an ulcer. . . This happened as a result of a trauma, falling from a great height, or difficult delivery" [46:416]. Amirdovlat considered the treatment of only the earliest stages of malignant tumor development to be effective, preferring conservative methods of treatment, especially phytotherapy.

Since his early days, Amirdovlat was very interested in medicinal botany and pharmacognosy. In 1459 he wrote his first *Akhrabadin*. This extensive work on pharmacology differed greatly from eastern *Akhrabadins*, in which only complex medicaments were described. In its structure an unmistakable influence of Gagik-Hetum's *Bzhshkaran* can be felt. A separate chapter (chapter 23), dedicated to descriptions of simple medicaments, is located right after the treatise on complex medicaments. Amirdovlat wrote in the foreword: "For I saw, that *Akhrabadin* cannot exist without *Mufradat*" [54, folio 48a]. The above-mentioned chapter 23 is also conditionally named *The Tabular Diction-*

ary. The latter consists of seventy tables, each taking both sides of an open folio. The left side of each folio, which is made into a table with horizontal and vertical lines, consists of the following columns:

1) names of simple medicaments in five languages (Armenian, Greek, Frankish, Arabic and Persian);

2) a description of the way the medicament looks;

3) the best medicinal species;

4) the nature of a medicament;

5) the dosage.

The right side of each folio has only one column: the properties of a medicament, in which there are references to an authoritative source (Dioscorides, Galen, Ibn Masavaih, Ibn Sina, Ibn al-Baytar, etc.). Each table contains the description of five medicinal compounds, and there is a total of 350 descriptions of inorganic-, animal-, and plant-derived medicaments in *The Tabular Dictionary*.

The Tabular Dictionary served as source material in creating the book *Useless for Ignoramuses*. And the *Akhrabadin* itself was, in the year 1459, the first attempt to create a dictionary of simple and complex medicaments. A desire to structure books on pharmacology in an understandable manner, and to facilitate their usage, brought forth the dictionary-like format. That is why the later books by Amirdovlat: the second *Akhrabadin*, and *Useless for Ignoramuses*, that were written at approximately the same time, both have the dictionary-like format. Here, the complete delineation was made between simple and complex medicaments—the process that began in Mkhitar Heratsi's time, and ended in works of Amirdovlat.

Sources of the Medieval Armenian Encyclopedia

Encyclopedic work by Amirdovlat Amasiatsi is not solely the result of his own observations and research, but also the experience of preceeding generations of ancient, Armenian and other natural philosophers and physicians, whose works he often quotes. In *Useless for Ignoramuses,* he cited a total of fifty sources, quite a large number for that time. In the second book of the *Canon*, dedicated to simple remedies, only thirty sources are mentioned. However, al-Biruni's *Saidana* far exceeds the above-mentioned works in number of cited works (250 sources cited). But in *Saidana*, works of physicians and pharmacognosists comprise only a quarter of the total number of works, the rest being works by philosophers, poets, philologists, geographers and travelers.

On many occasions Amirdovlat cites works of physicians, pharmacognosists and natural historians of ancient and Byzantine eras: Hippocrates, Aristotle, Galen, Dioscorides, Rufus, Xenocrates, Kratevas, Paulus Aegineta, Theodocus, and Gunos. Nowadays names of some of them are little known or forgotten. The Armenian *bzhshkapet* considered works by the father of scientific medicine, Hippocrates (460–377 B.C.), as one of the main sources for his book. In his works, this Greek physician was able to summarize the heritage of the entire ancient medicine, formulating many of its theoretical concepts: the concept of humors, the concept of pathogenic influences of external and internal environment, the concept of stages of disease, dignostics and prognostics, as well as the development of rational principles and methods of treatment [82].

The works of Hippocrates were first translated into Armenian in the times of Hellenophile school, but only fragments from manuscripts which were copied later survived to our time. Amirdovlat undoubtedly knew these manuscripts, but often used more complete Arabic translations, because he brings Hippocrates' name in its Arabic form 'Bagarat' instead of classic form 'Hippocrates' adopted in earlier times.

Works included in the *Hippocratic Collection* were well known to medieval Armenian physicians, starting with Mkhitar Heratsi. Quite often they did not even mention the title of a particular work, taking it for granted. Amirdovlat too did not specify the titles of books by another authority of ancient science, the Roman physician Galen (130–200), whom he cited on many occasions in his pharmacognosy.

Galen's works were translated into Classical Armenian at about the same time as Hippocratic collection, but reached us only as later copies of the fifteenth to seventeenth centuries. *The Galen Dictionary* which was preserved in medieval Armenian literature gives brief explanations of approximately 400 Greek terms. A vast majority of them are names of medicinal compounds from Galen's and Dioscorides books [83:1:179–196; 84]. *The Galen Dictionary* is considered to be written in sixth-seventh centuries, however, some of the historians of Armenian medicine attribute it to later times (tenth century) [85]. One piece of evidence which favors its antiquity, in our opinion, is the fact that there is no sign of the shift of the consonants that took place in the Middle Armenian language. As far as the small amount of Arabic terms is concerned, they were put into the manuscript during the later edition. One of the copies of *The Galen Dictionary* was written by Amasiatsi's hand, and even was, by mistake, included in the list of his works [8:3:13–14].

Works of another great Greek scholar—Aristotle (384–322 B.C.), were also very much honored by Armenian scholars. Some of them—*Categories* and *On Interpretation*, were translated by the Hellenophile school of translators in the sixth century. Amasiatsi at one time gave them to the scribe Andreas to make copies [49:188]. In *Useless for Ignoramuses*, Amirdovlat cites Aristotle's *Animalia*, which he knew from its Persian translation, for he calls it *Khavas-i-hayvanat*. He also refers to the *Book on Stones*, which was earlier attributed to Aristotle; however, it was later found to belong to an anonymous Syrian author of the 9th century [69:4:62].

One of the main sources of Amirdovlat's pharmacognosy was *The Materia Medica* by an ancient botanist, pharmacologist and physician Dioscorides (first century). The Armenian *bzhshkapet* read it not only in the Arabic translation but also in the language in which it was originally written. It is possible that he had a Classical Armenian translation that did not survive to the present day. He also cites the

author of the five-volume pharmacognosy—Karatevas (in Arabic Gharatis)—the court physician of Mithridates Eupatorius (132–63 B.C.) [63:4:64]. Among Greek physicians there are mentioned names of Xenocrates (in distorted Arabic form Kasufration), Arhigenes (in distorted Arabic form Archychanis) and Rufus [96:71–76, 252]. Little is known about the first two, whereas Rufus (first century) was a recognized authority of medicine. Chief-physician of the emperor Julian the Apostate, the Greek physician Oribasius (325–402 or 403) who wrote for Julian a 70-volume medical encyclopedia, was even more popular among learned Armenians. The work *On Public Medicines* is also ascribed to him [69:4:74–75]. Even though fragments of Oribasius's works survived in Classical Armenian translations, in later times Armenian physicians used a more complete Arabic translation, citing Oribasius's name as it is pronounced in Arabic. In *Useless for Ignoramuses,* he was called Arpiasus, whereas the author of Gagik-Hetum's *Bzhshkaran* gives a correct Greek transcription of his name. Among pharmacognostic works of the Byzantine physicians, the so-called *Dioscurides of Constantinople*, written in the beginning of the sixth century for the princess Juliana, has a very special place. A long time before the eastern *mufradats* were written, in this work there was already used a vocabulary principle; i.e. medicines were described in the order of the Greek alphabet letters [87]. Despite the fact that Amirdovlat does not directly cite this work, there is a good chance that he was familiar with it, for the latter was brought from Constantinople to Vienna only in 1569, at which time it got its name *Viennese Dioscurides* [88]. Amirdovlat mentioned two physicians of the Byzantine era: Paulus Aegineta (615–690) and Theodocus (died in 708).

Paulus Aegineta had written a 7-volume medical encyclopedia, famous in medieval times, the entire last volume of which was dedicated to simple medicines [69:4:76]. Amirdovlat also refers to a book *On Substitutes*, without mentioning the author's name. This could have been the work by Paulus Aegineta, but other medieval pharmacognosists, including Rhazes, also wrote similar works. Amirdovlat himself left us a small dictionary of substitutes of simple medicines, which was included in his first *Akhrabadin.* The name of a contemporary of Paulus Aegineta, the physician Theodocus, was known to a much lesser degree. Theodocus wrote a book on methods of preparation of medicines, to which Amirdovlat often referred

[86:22–23]. Among the Greek physicians cited in *Useless for Ignoramuses* it is also worth mentioning Qusta ibn Luqa (who was called by Amirdovlat as Custion), who lived during the height of Arabic medicine (820–912). The latter had written original works on medicine, and also translated works of ancient authors. This Greek physician lived in Armenia, at the court of Gagik,[1] the king of Vaspurakan, for a long time. After his death, the Armenian king ordered a mausoleum to be erected to commemorate his chief-physician [8:1:215–216].

Works of Syrian physicians and natural historians were also among the many sources for *Useless for Ignoramuses*. In the Middle Ages, Syrian medicine had reached a high level of scientific development [89]. In the past, in Edessa, there was a famous academy, which ceased to exist because of the persecution of the Nestorians. After moving to Persian Christian communities, they founded a famous Dzundishapur school, many representatives of which spent several centuries translating works of ancient philosophers, physicians and natural historians into Syriac and Arabic.

Among the Syrian physicians, the figure of Abu-Zakariya ibn Masavaih (777–857) stands out. He was the son of a pharmacist from Dzundishapur, the head of the Baghdad Board of translators, the so-called House of Wisdom. Apart from translations, ibn Masavaih created a whole array of his own works, which were often referred to by Amirdovlat, among them *The Collection on Medicine*, *The Book that Brings Success* and *The Book of Substitutes* [69:4:82]. One of his disciples was the famous Hunayn ibn Ishaq (808–873) who later became the head of the House of Wisdom. Knowledge of the Greek, Syriac, and Arabic languages allowed Hunayn, together with his son Ishaq and nephew Hubaish and other pupils, to translate works by Hippocrates, Aristotle, Galen, Dioscorides, Oribasius and Paulus Aegineta. They also wrote original works of their own. So Hunain was the author of

1. Instead of Gagik (ruled 908–943), in the literature beginning from *Short History of Dynasties* by Barhebreus (thirteenth century) [88a], there is erroneously mentioned the name of Senekerim, the last king of Vaspurakan (ruled 968–1021). As Qusta ibn Luqa was already dead in 912, it is obvious that he was living in Armenia during the glorious reign of Gagik Artsruni.

The Book about Names of Simple Medicines, whereas Ishaq[2] and Hubaish wrote *The Book of Simple Remedies* [90:1:205]. In *Useless for Ignoramuses* there is also mentioned another contemporary of Hunayn, Ali ibn Rabban at-Tabari (b. 808), the author of the medical work *The Paradise of Wisdom*, as well as his younger colleague, the physician Serapion (second part of ninth century) [90:1:207; 69; 4:88]. The latter had written two medical compendiums (Kunnash) in twelve and seven volumes, which Amirdovlat also cited.

The name of the Syrian physician Yesu was also mentioned in *Useless for Ignoramuses*. References to his work also exist in Gagik's *Bzhshkaran* as well as in Mkhitar Heratsi's works, where there are recipes written by him for Grigor Pahlavuni, the son of the *sparapet*[3] of the Bagratid kingdom, Vahram Pahlavuni. One can speculate that authors refer to a well-known ophthalmologist Sharafaddin Ali ibn Isa al-Kahhal (who died in 1010), the author of *The Notebook of Ophthalmologist*. But, in general, in medieval literature there are mentioned more than twelve Christian physicians with the name Yesu (Isa) [91:121]. Some of them had lived in Cilician Armenia for a long time. One of them is the Syrian physician of the twelfth century, Yesu, or Ishokh, the author of *The Book on Nature*. Apart from that work, the latter Yesu, in cooperation with the Armenian historian Vardan Areveltsi, in 1248 translated into Armenian *The Chronicle* by Michael the Syrian, which Amirdovlat later ordered to be copied for his son. Therefore, starting with the eleventh century, contacts that existed in earlier times between Armenian and Syrian physicians significantly deepened and became magnified [92]. In the era of the Cilician Armenian state, in which Armenians, Greeks and Syrians lived side by side, such contacts became even more strengthened. The creation of the anatomical treatises by the Cilician physician Abu Said named *On Human Composition* and *Faradj's Book of Treatments of Horses and Beasts of Burden in General* [93], refer to this time.

By the tenth century Syrian physician-translators of the

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2. One of his contemporaries who was often confused with him—a Jewish physician from North Africa named Ishaq ibn-Sulaiman al-Israili (called the son of Soghomon in Amirdovlat's book), who was also known under this name.

3. Commander-in-Chief.

Dzundishpur and the Baghdad schools had translated the majority of the most important works of the ancient authors into Arabic. On this foundation grew the eastern (mainly in Arabic) literature, that was conventionally called Arabic, despite the fact that apart from Arabs, many peoples that lived in the eastern and western califates (Persians, Syrians, Jews, Greeks, etc.) took part in its creation [94:32–59]. The names of many of them (more than twenty authors) are mentioned in *Useless for Ignoramuses.* Of their works the following ones were among the main sources of Amirdovlat's pharmacognosy: the second book of the *Canon, The Grand Collection on Properties of Known Simple Medicinal and Edible Things* by Ibn al-Baytar and *Badiya's Ikhtiyarat* by al-Ansari.

The brilliant physician, philosopher and scientific prodigy Abu Ali ibn Sina (980–1037) who lived in Middle Asia, in his work managed adequately to express the flight of creative thought in the East. In Armenia, the name of "the grand duke of philosophers and physicians" was greatly honored. Armenian physicians were frequently referring to his authority, while copiously citing his *Canon.* The work on pharmacognosy written by his contemporary, the extraordinary scientist from Khwarazm, Abu-r-Rayhan Muhammad ibn Ahmad al-Biruni (973–1048), was known to a much lesser degree. Amirdovlat cited his name only once while describing Lemongrass[4]: "The author of this book said that Abu-Rayhan [stated] that it is called *Kirta-y dashti*" [43:186]. Indeed in the Saidana it is said about Lemongrass (Arabic name: *izkhir*): "*Izkhir* is *Kirta-y dashti*" [69:4:171]. The small popularity of this marvelous work in the Middle Ages could be explained by a whole array of reasons. U. I. Karimov wrote: "From a written remark of one of the translators of *Saidana* we learn that it remained unfinished in the form of a draft, which was one of the causes of [incorrectness] of its later copies. This fact, as well as an abundance of non-Arabic terms, along with the lack of data on medicinal properties of described compounds, did not contribute to the wide spread use of the book among medical practitioners. Only certain scientists referred to it with purely scientific purpose" [69:4:11].

The Spanish physician from Malaga—Abu-Muhammad Abdallah ibn-Ahmad ibn al-Baytar (1197–1248) contributed greatly to the

4. *Andropogon schoenanthus* L. (*Poaceae*).

development of medieval botany and pharmacognosy [90:1:647]. His book *The Great Compendium of Properties of Simple Medicines and Food-stuffs* is one of the most fundamental in medieval pharmacognosy. In this book Ibn al-Baytar described the medicinal plants of the Pyrenean peninsula, Greece, Egypt, Asia Minor and Syria. These were the countries with which Ibn al-Baytar became familiar during his extensive travel. Amirdovlat also visited these countries [95, 86:280–283]. In *Useless for Ignoramuses* he mentioned many Cordovan physicians: the famous surgeon Abul Kasim az-Zahravi, the author of *At-Tashrif* (*The Encyclopedia of Medicine and Surgery*), who was the court physician of Abdarrakhman III (ruled 912–961) [90:1:239–240], Abu-Bakr Hamid ibn-Samadjun (died in 1009 or 1010)—the creator of *The Book of Simple Remedies* [69:4:101]. In Amirdovlat's pharmacognosy there are references to Ibn al-Baytar's predecessor Abu Jafar Ahmad ibn-Muhammad al-Ghafiqi (died in 1165), who wrote the work on pharmacology which was later edited by Ibn-Baytar [90:1:643]. Among the whole array of physicians from the Western Califate, it is also worth mentioning Abu Imran Musa ibn Ubaidallah ibn Maimun al-Kurtubi (1139–1204)—the Jewish physician from Cordoba and the chief-physician of Saladdin, for whom he wrote *The Book of Advices* [90:1:489; appendix:1:893]. Amirdovlat cites his pharmacological works not only in *Useless for Ignoramuses* but also in the preface to the first *Akhrabadin.*

The list of physicians who lived in the territory of the western and eastern Califates, cited in Amirdovlat's pharmacognosy, is quite large. Here is mentioned a Jewish physician from Basra, Masarjavaih (eighth century)—the author of books *On Simple Medicines* and *The Substitutes*, and chief-physician of Harun al-Rashid (ruled 786–809), and a physician from Damascus Abu-l-Hasan Isa ibn Hakam Masih, who compiled *The Great Compendium* [69:4:81–82]. There is also mentioned an author of *The Treasury of Medicinal Science*, the famous physician, mathematician and astronomer from Harran (Mesopotamia) Tabit ibn Kurra (834–901), the translator of works by Archimedes, Euclid, Galen and other ancient scientists [69:4:91].

There are also references to Abu-l Faradj ibn at-Taib (died in 1043)—the leading physician of the Baghdad hospital, and to the connoisseur of Arabian flora, Abu Hanifa Ahmad ibn-Davud ibn Vanand ad-Dinawari (815 or 825–895)—the creator of the *Book on*

Plants [90:1:695]. Amirdovlat also often cites the famous *Manual* (*Minhaj*) by Abu Ali Yahya ibn Isa ibn Jazla (died in 1100) [90:1:485]. Apart from the above-mentioned work, which is a dictionary of simple and complex medicines, and was in later times heavily criticized by Ibn al-Baytar, the author had also written yet another *Manual*, dedicated to the problems of hygiene. This second *Minhaj* was in 1629 translated by the Armenian physician Hovhannes of Julfa [8:3:132].

In medieval Armenian medicinal literature, particularly in works by Mkhitar Heratsi and Amirdovlat Amasiatsi, one can find the name of an almost forgotten Arabic physician Abu Juraij Ar-Rahib ("The monk") [31:294]. His name appears in corrupted form "Apu Chareh." L. A. Hovhannisian mistakenly identified him with Abul Tussin El-Jaredi (tenth century) [22:219].

In *Useless for Ignoramuses* Amirdovlat also cites the work on simple medicines by the Maghrib physician Ibrahim ibn Abu Said ibn Ibrahim al-Alai al-Maghribi (twelfth century) [90:appendix:1:890]. Several times Amirdovlat also mentioned Sharif, more particularly Ahmad ibn Abdassalam ash-Sharif as-Saqali (fourteenth-fifteenth century), the Tunisian physician who compiled for Sultan Abu-l-Faris Abd al-Aziz the *Dictionary of Simple Medicines* [90:2:333].

K. Basmajian mistakenly identified Sharif with Muhammad Sharif-khan Dehlevi, the author of the book *Talif-y sharif*, dedicated to Indian medicines [43:IX; 96:283]. The latter, however, lived much later (died in 1805 or 1816) than Amirdovlat, and therefore could not have been mentioned in *Useless for Ignoramuses*. The mistake happened because of the confusion with counting years according to the *hajira* and Christian chronology: in the catalog of National Library in Paris, to which K. Basmajian was referring, the dates are according to *hajira*.

Some of the authoritative sources to which Amirdovlat referred quite often, were the following works by a brilliant eastern physician, chemist and philosopher Abu-Bakra Muhammad ibn-Zakariya ibn Yahiyi Ar-Razi (865–925): 1) *Kitab al-Havi*; 2) *Kitab al-Jami*; 3) [*Havas*]; 4) *Kitab al-Mansuri* [69:4:95–97]. Among the twelve works that were included in the second book, *Saidana* and *The Book on Substitutes* were dedicated to pharmacology.

Before Ibn Sina's *Canon*, the most revered book in the eastern medicine was *The Regal Book* by a Persian scholar Ali ibn Abbas al-Madjusi, or 'Zoroastrian' (died in 994), whose name was mentioned in

Useless for Ignoramuses [69:4:94]. His contemporary, Abu Mansur Muwaffaq ibn Ali al-Harawi, had written, in 975, the first pharmacognosy in the Persian language—*The Book of Basics on the True Properties of Drugs*, that played a big role in the development of this branch of medicine in Iran [96:199]. In the fourteenth century, about one hundred years before the appearance of *Useless for Ignoramuses,* a book, written in 1396 in Persian, was dedicated to princess Badiya—*Badiya's Ikhtiyarat* [96:220; 97]. Its author was Zain al-Din Ali ibn (Jamal al-Din) al-Husain al-Ansari (1329 or 30–1409), known under the synonym Khoja Zain al-Attar, the court physician of the Shiraz *muzafarid* Shah Shuj. His work consisted of two parts, in which were separately treated simple and complex medicines. Amirdovlat refered to this work briefly as "Patihi" or "Paten." Here al-Ansari described the medicinal flora of Iran, especially the flora of Shiraz and its surroundings, e.g., places very familiar to Amirdovlat.

Amirdovlat Amasiatsi mentioned the names of the medieval Armenian physicians of the twelfth-thirteenth centuries, starting with the head of Cilician school Mkhitar Heratsi, who paid a great deal of attention to pharmacology. His pupil and follower was the physician Stepanos, the son of the famous Armenian physician from Edessa—Aharon, the patriarch of a whole dynasty of physicians, among them Choshlin, Sargis, Hakob, Deghin, Simavon and Vahram. Stepanos in 1231 had written a voluminous medicinal work *Tsaghik*, the main sources of which were Mkhitar Heratsi's works on pathology, therapy and pharmacology, as well as Gagik-Hetum's *Bzhshkaran* [98]. In a colophon, the author said: "And I, the sinful servant of God, the son of the physician Aharon from Edessa, which is otherwise named Urfa, gave an account of the little that was known to me, and considered to be helpful according to observations of many [scholars], I learned [this knowledge] from my father Aharon, from the physician Mkhitar and Simeon" [8:2:148].

Stepanos's work was copied in 1481 "by the chief surgeon, [who treats people] sick with eye diseases" (meaning Amirdovlat Amasiatsi). Unfortunately this precious manuscript as well as many other works of the Cilician School were destroyed during the years of Armenian genocide in Turkey. Of these works only fragments survived that were included in writings of later authors, including Amirdovlat. Thus, the Armenian *bzhshkapet* also played the role of a savior of traditions of

Armenian medicine and its written heritage, as did Galen, who in his works saved names of many physicians of the preceding era, whose writings do not survive in our time [99:6].

Among the sources of *Useless for Ignoramuses* it is especially worth mentioning "the author of this book," who sometimes was called "the collector and compiler of these writings." Following common practices in the medieval literature tradition, Amirdovlat did not always present his views in the first person: "I myself experienced that," "And I, the unworthiest of physicians, keep that opinion," "And I, the unworthy servant of God, has noticed" etc., but also as an "author": "The author of this book says," "The author of this book said and determined" etc. Note that in Ibn al-Baytar's writings, free description of material in the first person intermingles with citations from various sources, among which there is also the "author."

Descriptions of the flora of Shiraz in *Useless for Ignoramuses,* given by the author in the first person, made K. Basmadjian compare them with ones given in *Badiya's Ikhtiyarat.* He writes: "It must be acknowledged that based upon the whole host of references, we can suppose that 'the compiler of the book' and Patehi (the author of *Badiya's Ikhtiyarat*) is the same person. At first, this thought looked very tempting to me. But Amirdovlat's words about the fact that 'the author of this book' agrees with Minhach's opinion and repudiates views of Patehi and Chamei, made me abandon this hypothesis." [43:XV]. There is no doubt that many times "the author of this book" refered not only to his own observations, but also to the experience of his predecessors. But in such cases he more often calls authorities of ancient and eastern medicine "the first compilers of this book" and "the first authors of these writings," deeply appreciating their role in the development of pharmacognosy, and considered himself, just like the author of Gagik's *Bzhshkaran* did before him, their humble pupil and follower.

Manuscripts of the Medieval Armenian Encyclopedia *Useless for Ignoramuses*

The medieval Armenian encyclopedia, *Useless for Ignoramuses*, written by Amirdovlat Amasiatsi, was a result of four years of diligent work. It summarized many years of the author's research in medicine, medicinal botany, zoology, mineralogy and geography. It was intended to last for many years to come, and proved to be useful not only to Amirdovlat's contemporaries, but also for countless generations of Armenian physicians and naturalists. The occasion of the five hundredth anniversary of the book, in 1982, testifies to its great scientific value and enduring qualities. After the book's first hand-written copy initially appeared in Constantinople in 1482, the book was re-copied countless times in many manuscript centers of eastern and western Armenia.

Unlike early works by Amirdovlat—*The Lore of Medicine* and *Akhrabadin*, the autograph of the book *Useless for Ignoramuses* was unfortunately lost. Among the fifteenth century copies, only one had survived—The manuscript Or 3712 of the British Library. On this single copy which was made during Amirdovlat's lifetime, and at his expense, there is a colophon of the scribe, in which names of physicians that belonged to Sebastian school are listed. This copy of the book was used by many generations of Sebastian physicians, among which was the famous Asar Sebastatsi, and then, by some mysterious stroke of fate, appeared in one of the largest book depositories of the world—the library of the British Museum [55:313–318].

The historical and political atmosphere during the fifteenth-sixteenth centuries contributed little to the preservation of manuscripts. Therefore, it is not surprising that the only manuscript that survived from that time was the British Museum's parchment copy. The great majority of written on paper copies of the book *Useless for Ignoramuses* belong to the later and relatively quieter times of seventeenth-eighteenth centuries. During this time, the geography of distribution of Amirdovlat's work had changed as well. Before the eighteenth century, the main centers of distribution, copying and use of

the book were Constantinople, the cities of Asia Minor, and Western Armenia. In later times, the book found its way into Eastern Armenia and the Transcaucasian region (Echmiadzin, Yerevan, Tiflis, Gandzak).

In the manuscript collection of the Mashtots Matenadaran there exist twenty copies of the book *Useless for Ignoramuses*, eleven of which were made in the seventeenth century, six in the eighteenth century, and three in the nineteenth century [56:1:314, 315, 323, 324, 865; 56:2:285, 323, 513, 536, 604, 621, 661, 817, 887, 998, 1083]. Approximately ten copies exist in collections in Vienna, Paris, Aleppo, Antilias, as well as in private collections [57:104–107; 58:128, 131; 59:37–40; 60]. The library of the Mkhitarist Congregation in Venice, one of the richest collections of Armenian manuscripts in the world, has among its possessions sixteen hand-written copies of Amirdovlat's works [61:667; 62], however, the exact quantity of copies of the book *Useless for Ignoramuses* requires verification. V. Torgomian described some of them in several of his works [63–65].

Descriptions of the two most important copies of the book *Useless for Ignoramuses* from British Museum and Mashtots Matenadaran are presented below.

***Manuscript Number Or 3712* from the British Library.**
Amirdovlat Amasiatsi. *Useless for Ignoramuses.*
Time written: 1490.
Place of origin: unknown (probably, Sebastia).
Scribe: unknown.
Miniaturist and Bookbinder: monk Martiros.
Copy was ordered by: the physician Amirdovlat Amasiatsi.
Dimensions: unknown[1].
Material: parchment, slightly yellowish. There are two blank pages left in the beginning of the manuscript (1, 2a).

Quires: a total of twenty-four numbered quires: second and twenty-fourth: six folios; third: nine folios; nineteenth: eleven folios; all other quires have twelve folios each. Quires are numbered by the letters of the

1. Data concerning the dimensions of the book are missing from "A catalogue of the Armenian manuscripts in the British Museum" by Conybeare [55]. At the time of writing only a photocopy of the book was in the author's possession.

Armenian alphabet on the bottom of the page in the beginning and the end of each quire. Folios are numbered with continuous pagination (on the first six folios of each quire).

Font: Bolorgir. The manuscript is written in one column in black ink; starting from folio 189 to the end of the book it is in darker ink, and, probably, by a different pen[2]. The names of the chapters, and first words in the paragraphs are written in red ink. Number of lines: thirty-nine.

Protective folios: two parchment folios at the end of the manuscript from the Armenian Gospel of St. Matthew (no later than twelfth century).

Illustrations: ornamented inserts (folios 3, 13). In the center of the insert, encircled by an outline of a medallion,—a saying from the foreword: "If you would like to become a man of knowledge, use the book, [for] it is called *Useless for Ignoramuses* [not without reason]" (folio 3a). Marginalia and initials in the shapes of bird outlines, and plant ornaments (gold, blue dye).

Book-cover: Textured brown leather.

Manuscript condition: satisfactory. Text pagination is out of order after subsequent binding. Text must be read in the following order: 1–15, 19–24, 16–18, 25–36, 38, 37, 39–46, 48, 47, 49–132, 135, 133–134, 136–141, 144, 142–143, 145–184, 189–192, 185–188, 193–216, 218–228, 217, 229–281.

Content: text of the book *Useless for Ignoramuses.* It consists of: a) author's foreword (folios 3–12); b) a dictionary of simple medicinal compounds in thirty-six chapters—one for each letter of the Armenian alphabet (folios 13–280). Starts with the paragraph *aalusan* (Golden Tuft)[3] and ends with the paragraph *frugut ilavut* (Sea Holly)[4]. Certain paragraphs are missing: *laghyay* (Milkweed)[5], *chavp-y chini* (China

2. Conybeare had pretty much the same opinion, also speculating that the second part of the text could have been written by an another person [55].

3. *Alyssum saxatile* L. (*Brassicaceae*).

4. *Eryngium maritimum* L. (*Apiaceae*); in some cases it is also identified with *Carduus* L.

5. *Euphorbia triaculeata* Forsk. (*Euphorbiaceae*).

root)[6], *frik* (roasted Wheat) as well as some other. At the end of the manuscript there are some recipes (folio 281b).

Colophon of the author (folio 3a): "Written during the reign of the Saracens from the clan of Ismailites, descendants of Agar, when the Greek Kingdom was decimated, in the capital city of Constantinople (may Christians that dwell there abide inviolably and unshakably!), during the reign of sultan Muhammat-Khan, and the patriarchate of the Right Reverend Sargis on the altar of Holy Echmiadzin, and episcopacy of the patriarch Nikolaios in the city of Constantinople, in the year 927 [1488] of Armenian chronology, [which is] written above in red letters, at the temple of the wonder worker the holy Nikolaios, who was always prompt with his help. This book is compiled of properties of medicines, each one presented separately, based upon the multitude of foreign writings, by the hand of the sinful, mischievous and ignorant physician Amirdovlat Amasiatsi in commemoration of himself and all Christians."

Colophon of the author: poetry (folio 281a):

Praise to You, oh Lord and Creator!
Show mercy on us, You, who gave
People senses and mind.
Everything is created by You in this world,
Everything alive sings praise to You.
Thank You, Jesus,
Immortal King,
Who has given me the predestined term [of my life]
Four years, day and night,
[Tirelessly] I worked.
From many manuscripts I compiled this one.
All words of medicine that I could find
I assembled and wrote [here].
And all that I had learned from them,
I will reveal when I am done with this dictionary
In many tongues—in five:
Armenian [my native one],
And the tongues of Greeks and Arabs,
And the tongue of Persians and the Turkic tongue,

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6. *Smilax china* L.

And there is a little of Latin also.
I put all words,
Names of all the medicines and herbs,
Like Armenian alphabet ordered me to,
[And, starting with the letter "Ayb"],
I ended the dictionary
With words, that [start] with "F"
I am Amirdovlat, the son of Yeghia,
Born in the city of Amasia,
Amirdovlat living now in Byzantium,
Which is unlike any other [city] in the world
This capital of the Turkish state,
It is called by them [the city] of Constantin.
And those who will read this work,
I implore to be before the Lord,
My patron,
That He shows mercy on the scribe
And the creator of this book,
May there be no flaws in it,
That written in the year 931 [1486]
Of Armenian calendar.
And praise the Lord!

Colophon of the scribe (folio 2b): ". . . so, my beloved, those that will enjoy this richest of the treasuries [of knowledge], which is assembled here, may you remember in your worthy prayers before the Lord, us, your humble servants, and our old physicians: Khoja Barkhudar Sebastatsi, his son, surgeon Asar, and his son, physician Petros, and Grigor, and Asar-agha, and their grandchildren: physician Mikael and his brother Khoja Gevorg, and his son, priest Manuk. . ."

Colophon of the miniaturist and the bookbinder (folio 281a): "[May you,] readers, remember in your prayers, the monk Martiros, who decorated this book with gold, and bound it, as well as the physician Amirdovlat, who ordered it to be decorated in the year 939 (1490) at his own expense, [with money] earned by honest work."

Postscript (folio 281a): "On Thursday, December 8, 945 (1496), the physician Amirdovlat, the author of this book, had passed away in Christ."

***Manuscript Number 414* from the Mashtots Matenadaran.**
Works of Amirdovlat Amasiatsi.
Place of origin and time written: Marzvan, 1626.
Scribe: Karapet.
Editor to whose order the copy of the book was made: the physician Buniat Sebastatsi.
Dimensions and the number of folios: 26x20 centimeters, 428.
Material: paper of European kind with the watermark[7] in the shape of a trefoil (folio 210, 216).
Quires: total of thirty-six numbered quires: first and twenty-sixth: eleven folios; thirty-sixth: thirteen folios; all other quires have twelve folios each.
Font: Notrgir. The manuscript is written in two columns in black ink. Number of lines in the 1st part (folios 2a—255a): thirty-nine, second part (folios 255b—426b): forty-one.
Lost folios: between 197b and 198a.
Protective folios: two folios (at beginning and the end of the manuscript) from an Armenian Gospel of tenth-eleventh century, written in bolorgir on parchment.
Illustrations: ornamented inserts (folios 2a, 364a). Marginalia and initials in dark crimson and dark blue color, anatomic drawing with explanations (folio 427a).
Book-cover: Textured brown leather.
Manuscript condition: satisfactory. In certain places some wax is visible, ink and moisture stains. Some folios of the first part (1—189) are damaged by mice around the edges. The manuscript has been restored.
Content: 1) text of the book *Useless for Ignoramuses* by Amirdovlat Amasiatsi (folios 2a—219a). Consists of: a) the author's foreword (folios 2a–10a); b) dictionary of simple medicinal compounds in thirty-six chapters with the title: "On properties of medicines described each separately." It starts with the paragraph *aalusan* and ends with the paragraph *frughut ilavut.* Names of medicinal plants and, sometimes names of certain authors are written in red ink. Marginal notes written by a different hand (at a later time), in black ink. Some of the editor's notes are included in the text, and at the end of the paragraph about

7. For more detailed information see [66:640].

Sarsaparilla[8] (*chavp i chini*) there is the following postscript: "This is written by me, unworthy Buniat" (folio 153b).

2) text of the book *Benefits of Medicine* by Amirdovlat Amasiatsi (folios 220a–362b) with a subtitle: "This book is about treatment and care."[9] It consists of: a) a foreword (folios 220a–257a), in which a list of chapters is given (folios 222a–225a), and, besides that, an "Anatomy from another writing"[10] is also included by an editor Buniat Sebastatsi (folios 236b–240a); b) the text of the book itself, with a subtitle: "The Book of the Art of Medicine" (folios 257b–362b) with number of chapters written on margins in black ink.

2) text of the book *Akhrabadin* by Amirdovlat Amasiatsi (folios 363a–426b). Consists of: a) foreword (folios 363a–364a); b) dictionary of complex medicinal compounds (folios 364a–426a) with a list of chapters written on margins in black ink.

Colophons of the author: for the book *Useless for Ignoramuses* (folio 219a) (see description of the manuscript IV, A); for the book *Benefits of Medicine*: "And this writing was created by me, God's unworthy servant, the physician Amirdovlat Amasiatsi, in the capital of [Rumelia], the city of Philip[popolis], in the year 915 [1466] of the Armenian chronology, on December the 25th,[11] on Thursday, which is the Day of the Savior according to other people's calendar. . ." (folio 220a); "I created this excellent [book of medicine] in the capital of Rum[el]ia, the city of Philip[popolis], in the year 918 [1469] of Armenian chronology, on December the 26th, which is the Day of the Savior according to other people's calendar, during the patriarchate of the patriarch Ristakes and the episcopacy of Ter-Hovakim. Whoever will copy or read [this book], let him ask Jesus for absolution of sins for the author of this book, the physician Amirdovlat. . ." (folio 221a).

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8. *Smilax sp.*

9. I.e., care for sick people.

10. We concluded that the *Anatomy from Another Writing* is a fragment consisting of 12 chapters from the book *On Human Structure* written by a physician named Abu Said, who lived in Cilician Armenia (see: [29:11]).

11. Unlike many other Christian peoples that celebrated Christmas on December 25, in Armenian tradition it is celebrated on January 6, i.e., on the day of Epiphany.

Colophon of the editor (folio 221a): "And also [may you pray for] the last editor of this book, Buniat Sebastatsi. We spent much effort in studying this art, and with God's help cured many. We liked very much this excellent book, and we ordered Karapet to have it copied in the year 1075 [1626] of the Armenian chronology, in the city of Marzvan. Previously we resided in Samsun and collected many books, Armenian and foreign. But afterwards, the Russian nation grew stronger, and [pressed the Turks], and occupied the shores of the Black Sea. And [Russians] attacked Samsun at nighttime, and we had to flee away from the city, overtaken by the fire.[12] And we arrived to Marzvan, and ordered this book to be copied with God's mercy. Fathers and Brothers, I implore you, if you will read [this book], or copy it, treat it with an ultimate care. This is a very precious book and worthy of utmost praise. And he who will study this art with love, will see much goodness. . ."

Postscript of the scribe (folio 219a): "In the year 934[13] [1485] of our chronology, the physician Amirdovlat died in Christ. . ."

For textological research, the value of the only copy of the book *Useless for Ignoramuses*, which was copied upon the author's request six years before his death, and reviewed by him, is difficult to underestimate [68]. This book has a value of an autograph. The Manuscript #414 from the Mashtots Matenadaran is equally interesting. This manuscript was ordered to be copied by a famous Sebastian physician of the sixteenth-seventeenth centuries, Buniat Sebastatsi. Apart from *Useless for Ignoramuses* it includes two other works by Amirdovlat: *Benefits of Medicine* and the second *Akhrabadin*. The editorial work of Buniat Sebastatsi is especially obvious in the book *Benefits of Medicine*, so S. Malkhasiants, who published this work by Amirdovlat, named Buniat as the editor.

In *Useless for Ignoramuses*, his editorial work is less obvious. He made only a few additions to the text. So, in the chapter on the Red

12. He is talking about the raid on Samsun, undertaken by Cossacks in 1624-1625, in retribution for assassination of two Russian ambassadors [44:9:49].

13. The date of Amirdovlat's death—945 (1496)—is mistaken by the scribe.

Horned Poppy[14] (*khashkhash mugharran*) he made an addition: "Red Horned Poppy is common at the sea shore in Samsun," i.e., in the area well known to him. At the end of the paragraph about China Root he added: "This was written by me, unworthy Buniat," despite the fact that this paragraph also exists in unedited copies of the book. Generally, the first editor of *Useless for Ignoramuses,* treated it pretty carefully, without overloading the text with a lot of new material that was not important. But because of his scientific renown, many scribes started to prefer edited copies of *Useless for Ignoramuses* over unedited ones after 1626. Readers of the later times sometimes even put Buniat's name and remarks in manuscripts devoid of them originally.

The edited copy of *Useless for Ignoramuses* served as a protograph to K. Basmadjian for compiling a critical text. This manuscript was named by him as "Poranian, or Paronian" (after the owner's name). He wrote: "This manuscript, I suppose, at one time belonged to a famous physician of the seventeenth century, Buniat Sebastatsi. Data presented in this work, confirmed that to me" [43:VI]. While preparing the text of the book *Useless for Ignoramuses* for publication, K. Basmadjian included in it remarks made on the margins of the manuscript "Poranian" (a total of 376), which had not been included in the text by the first editor. Because the manuscript had lacunae, he supplemented the omissions in the original text by excerpts from the copy from the National Library in Paris, as well as from the copy from the Library of the Antonian Congregation in Constantinople. For verification of terms and damaged parts of the text, Basmadjian, used a photocopy of the manuscript from the British Library and two manuscripts from the Library of the Mkhitarist Congregation in Venice. Along with the foreword in Armenian and French, commentaries and indexes, the book *Useless for Ignoramuses* was printed in 1926 in Vienna, with a dedication to Marie-Louise Basmadjian, the wife of the scientist.

Especially interesting in the above manuscripts are colophons that contain precious material for understanding the psychology of the physicians of the bygone epoch: the physician himself had quite often served as a scribe or editor. In Amirdovlat's colophons, as well as in many other parts of the book, there can be heard echoes of the

14. Also known as Sea Poppy—*Glaucium corniculatum* Curt. (*Papaveraceae*). Some researchers identified this plant with *G. luteum* L.

historical turmoil, pain and compassion of the physician-humanist, who lived in a ruthless world. Many trials and tribulations were experienced by Buniat Sebastatsi, who dedicated his efforts to preserve the scientific heritage of his teacher. The enormous value of Amirdovlat's manuscripts can be readily seen from the careful way Buniat treated them, which was dictated not only by bitter experiences of Buniat himself, but also by the historical experiences of the Armenian people, who suffered many losses in the never-ending wars of the fifteenth and sixteenth centuries. Such careful attitude towards their written heritage allowed the Armenian people to preserve their culture despite all the hardships. Nowadays, the total amount of preserved manuscripts of Amirdovlat Amasiatsi exceeds seventy, half of which are in the Mashtots Matenadaran and an almost equal amount in foreign libraries as well as in private collections. Copies of the book *Useless for Ignoramuses* comprise the vast majority of these manuscripts.

The Structure and Contents of the Medieval Armenian Encyclopedia.

Useless for Ignoramuses is an extensive treatise in pharmacognosy consisting of the foreword and the main part—the dictionary of simple medicines. Colophons of the author and the foreword contain information on where and when the book was written, the author's biographic information, his unsatiable thirst for knowledge and collecting books, about his wanderings and journeys. Amirdovlat also pays tribute to his predecessors—Armenian medieval physicians, calling them "teachers." "And this deed also preoccupied our first teachers of medicine—the great physician Mkhitar and the physician Aharon, and his son, the physician Stepanos, and their kin: the physician Choshlin, the physician Sargis, the physician Hakob, the physician Deghin, the physician Simavon and the physician Vahram, who wrote many books about medicines and their benefits" [43:25].

Along with this, Amirdovlat found omissions in their works on pharmacognosy, for, according to him "it was common, that they knew the name [of the plant], but could not identify [the plant itself], or its substitutes" [43:2]. Al-Biruni, in his *Saidana*, was also complaining about deficiencies in the works of his predecessors and contemporaries. "I recall, that one of the Emirs of Choresmus got ill, and was sent a recipe from Nishapur, that would cure his sickness. [The recipe was shown to pharmacognosists, but they could not find the medicine indicated therein. Only one of them said that he had it [available]. Fifteen *dirhams*[1] of this medicine were purchased from him for five hundred *dirhams* of pure [silver]. He gave them an Iris[2] root. They reproached him, and he replied: 'You bought something unknown to you only by name, but not in essence'" [69:4:140]. Amirdovlat

1. According to various Arabic sources, this equals to 2.975–3.186 grams (depending on the particular medieval Arab country).

2. *Iris florentina* L., *I. germanica* L. or *I. pallida* Lam.

undertook his work in order to fill in these omissions and give to his contemporaries a true encyclopedia of medicines.

In the foreword he examined in great detail the theory of medieval pharmacology, developed in the works of the famous eastern scientists of encyclopedic learning: al-Kindi (ninth century) and Ibn Sina. Amirdovlat wrote: "And may you know, that everything created in the world by God the Creator, is divided into three kinds of substances: either food, or medicine, which could be beneficial for the body, or [poison] which causes it harm, changes the nature of the human body, and kills it" [43:3]. According to Amirdovlat's opinion, the difference between foodstuffs and medicines is that food "subjugates [itself] to the action of the human body," whereas medicine "subjugates it (i.e., the body) to itself (i.e., the medicine)."

The Armenian *bzhshkapet* paid much attention to experimental studies of medicinal compounds, emphasizing the necessity of the whole gamut of experimental conditions. "The first condition is that the medicine in question [should be] tried pure, devoid of additives. . . The second condition is that when one medicine is tried, it should be given to a person with moderate (balanced) nature, so its action on [this person's] nature would be visible. . . The third is that one medicine should be tried against one disease, but not against two or more diseases. . . The fourth condition is that when one medicine was found to be beneficial against several diseases, then it should be verified, whether its action is something characteristic of the medicine itself, or it depends on other extraneous circumstances. . . The fifth is that the potency of the medicine should correspond to the severity of the disease. . . The sixth is that the time of year should be taken into consideration, for there is a particular time of the year when the medicine works, and such [a particular time of the year] when it does not work or its action is weak. . . The seventh is that when these medicines are administered, their action should be constant" [43:4].

Some of these conditions were formulated in Ibn Sina's *Canon*, and some, more particularly second, third, and sixth, deviate from it [11:2:14–15]. In the case of Amirdovlat, the necessity of experimental purity, elimination of extraneous factors, and objective interpretation of experimental data, are clearly understood. This may serve as a testament to the fact that experimental method had found its way into pharmacognosy. Amirdovlat, however, was well aware of the dangers of

such experiments for a patient's health: "In our times it is not uncommon for physicians to try drugs which were not known to the first teachers of medicine. But, one ought to remember, that these experiments are quite dangerous and could cause great harm to human [health]" [43:5].

Amirdovlat also considered observation of animals a valuable research tool. In such manner were discovered the medicinal properties of Fennel, Celandine,[3] and some other plants, which were commonly used by snakes and swallows, who in this case played the role of "teachers of humanity."

To Amirdovlat, the elucidation of a drug's physical and chemical properties could serve as an important indicator of the drug's action. He wrote: "There are five ways in which the properties of these drugs could be learned. First—how they dissolve: quickly, or, on the contrary, slowly, second—with what speed do they dry: quickly, or, on the contrary, slowly. Third—by their appearance, fourth—by their smell, and fifth—by their color" [43:5]. According to medieval pharmacology, these properties of drugs depended on their nature, i.e., on predominance of one of four primary elements (water, earth, fire, air) and on their properties (cold, heat, moisture, dryness).

Coming from al-Kindi's doctrine about degrees of nature of drugs, Amirdovlat provides complex calculations for mixtures of medicines and analyzes examples of mixing various drugs together. "Let's examine a case of mixing drugs together, among which, the nature of one of them is hot in the first degree, [whereas] the nature of another is hot in the second degree. The drug whose nature is hot in the first degree contains two parts of heat and one part of cold, and the drug whose nature is hot in the second degree contains three parts of heat and one part of cold. And when both of these drugs are mixed together, the nature [of the mixture] will be hot in the last part of the first degree and in the initial part of the second degree, for each two parts of the cold four parts of the heat are required, so the ratio would be one to two, and the drug would be hot in the first degree. But [the given drug] has one part more heat than it is required for the first degree, and its nature enters into the second degree" [42:12].

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3. *Chelidonium sp.*

Further development of experimental pharmacognosy lead to a devaluation of speculative constructs of this theory, but in Amirdovlat's time it was not yet challenged. Determination of the nature of drugs and degrees of their action, as well as the nature of the patient, was considered to be a necessary condition for prescribing drugs according to the principle of Hippocratic medicine: to cure "opposite with opposite." Amirdovlat wrote: "It is necessary from the very beginning to determine the degree of warmth of the patient's body nature, and to give him a medicine of the corresponding degree [of coldness], in order to return the body to its normal condition" [43:4].

Medieval pharmacognosists who had chosen experimental studies of drug properties instead of scholastic speculation had invariably achieved success. In the book *Useless for Ignoramuses* there are provided descriptions of 64 experimentally obtained chemical and pharmacological properties of drugs. Many of these properties appear to form pairs with the opposite mode of action: thin—dense, causing gas—causing flatulence, ulcerating—scar-forming, moisturizing—drying, thickening—thinning, uroschesic—diuretic, hemostatic—hemorrhagic, toxic—antitoxic, etc.

The empiric heritage of medieval pharmacognosists was proven to be useful in rational methods of drug preparation (boiling, grinding, burning, washing). "There are medicines, which should be boiled for a long time, for example Rhubarb,[4] and there are such that require only a short boiling, as, for example, Violet[5] and Dodder.[6] And there also [exist] delicate medicines, which can not withstand grinding and pulverization, like scammonium,[7]" said Amirdovlat in the foreword to the book [43:21].

Amirdovlat paid a lot of attention to the rules of collecting and storing medicines. He wrote: "Leaves [of plants] should be collected only when they reach full development and did not start changing their color. . . And as far as seeds are concerned, for example seeds of Anise, Caraway, Cumin, and the like, they should be collected only when fully

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4. *Rheum sp.*

5. *Viola sp.*

6. *Cuscuta sp.*

7. Resin of *Convolvulus scammonia* L. (*Convolvulaceae*).

ripened and when there is no moisture in them. If roots [are concerned], as for example, roots of Pellitory,[8] Bahman,[9] Gentian,[10] and the like, they should be collected when leaves [of the plant] start to fall. And if flowers [are collected], for example Violet, or Narcissus,[11] or Lily,[12] and the like, they should be collected when they are fully open, but [when] petals have not yet started to fall or change their color" [43:21]. He recommended collecting plants when the weather is dry and fair.

Apart from plants, animal organs, tissues, blood and ashes, obtained after their incineration, were used in medieval pharmacognosy. Medieval pharmacognosists had strict requirements for mineral and animal raw materials. "As far as medicines that are made from organs of animal body, for example from their horns, or bile, or liver, they (i.e., organs) should be taken in spring from a young and healthy animal, and never from a fallen (i.e., dead) one" [43:21]. With respect to raw mineral material, Amirdovlat recommended taking "pure and good minerals, that do not have any impurities [like] soil or stones inside."

Storage of medicines was also done according to strict rules. In *Useless for Ignoramuses,* five methods of preserving drug's potency was indicated: "First method—take a medicine, make troches [from it], dry them in the shade and store, like, for example, Cinnamon. Second—mix a medicine with such [a different medicine] that by its nature aids in preservation of [the first] medicine, like, for example, camphor, that is stored with Pepper, or Prickly Poppy[13] with nuts. . . Third—store these medicines in such a vessel, that [medicines] would not loose their potency. Vessels should be with a narrow neck, which should be sealed with wax, so that the medicines would not be changed by air's action, and would not lose their properties, as, for example, musk and camphor and the like. Fourth—know, at which place a medicine should

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8. *Anacyclus pyrethrum* DC., (*Asteraceae*).

9. This name is associated with two different plants: *Statice limonium* L. (*Plumbaginaceae*) and *Centaurea behen* L. (*Asteraceae*).

10. *Gentiana sp.*

11. *Narcissus poeticus* L. (*Amaryllidaceae*).

12. *Lilium sp.*

13. *Argemone mexicana* L. (*Papaveraceae*).

be kept. This place should be moderate with respect to cold and moisture, warmth and dryness. Medicines should not be stored in a place which smells bad or is smoky. Fifth—remember the rules of storage of medicines, so that [strong] medicines are not kept with weak ones, for example, scammonium and opium" [43:22]. Many of these empirical rules do not lose their significance even in our time.

In the foreword, the author describes the structure of the main part of the book, the dictionary of medicines and instructions for their use. "May you know and understand, brothers, that the format of this book is such, that the name of one medicine is written in many languages in alphabetic order. . . And all names can be found alphabetically, but we mention the medicine's description only along with one name. And such is the way this book is built" [43:3]. Abbreviations, used in the book, are also listed in the foreword. "May you know, that for each language we used a special brief symbol. . . and these abbreviations we used in order to avoid verbosity and impede [the flow of] the narrative. And also we treated in the same manner names of teachers of medicine [and their works], assigning to them abbreviated symbols" [43:24].

The main part of the *Useless for Ignoramuses*, the dictionary of medicinal compounds, consists of 3378 paragraphs, that are subdivided into 36 chapters in the order of letters of Mashtots' Armenian alphabet. In the Middle Ages, classical pronunciation of some of the letters underwent changes and, apart from that, two new letters "o" and "fe" were introduced. In Amirdovlat's work, the chapter dedicated to "fe" contains 96 paragraphs.

Despite the fact that the same medicine can be found in several different paragraphs of the dictionary under different synonyms, only in one paragraph, and in some rare cases two, is a detailed description of its properties given. Therefore, the real number of medicines in *Useless for Ignoramuses* is significantly lower than the number of paragraphs, and comprises about 1400. From them, the overwhelming number, one thousand, are plant-derived medicines; 250 are animal-derived medicines and 150 are minerals. It is worth mentioning that in 750 paragraphs of the *Materia Medica* by Dioscorides, only 570 plants, 100 animals and 80 minerals are described. The total number of paragraphs of the second book of Ibn Sina's *Canon* is 811, in which 590 plant medicines, 125 animal medicines and 85 minerals are mentioned. In 1116 paragraphs of *Saidana*, al-Biruni described 880 medicinal

plants, 101 animal and 107 minerals. And, at last, in *The Grand Collection on Properties of Known Simple Medicinal and Edible Things*, Ibn al-Baytar gives description of more than 2600 names of medicines, about one third of which are synonyms. Thus, considering the amount of information, the book *Useless for Ignoramuses* by Amirdovlat Amasiatsi holds a respectable place among the most voluminous pharmacognosies of ancient and medieval authors. Physical, chemical, medicinal and toxic properties of plant-, animal-, and mineral-derived drugs, data on plant morphology and their geographic distribution, as well as many other useful data, are presented in this unique book.

Medicinal plants used by Amirdovlat are mostly representatives of higher plants: mosses, ferns, gymnosperms and, especially, angiosperms or flowering plants. Some lower plants, such as algae, lichens, and fungi, are also mentioned in the book. Species and genera of flowering plants that are mentioned most often in *Useless for Ignoramuses* belong to the following families: *Liliaceae, Orchidaceae, Gramineae, Papaveraceae, Ranunculaceae, Brassicaceae, Urticaceae, Malvaceae, Rosaceae, Polygonaceae, Fagaceae, Capparidaceae, Fabaceae, Apiaceae, Laminaceae, Solanaceae, Scrophulariaceae, Asteraceae*, and some others. Apart from flowers, leaves, seeds and roots, vegetable oils, milky juices and resins also served as raw materials for preparing medicaments.

Many representatives of the animal kingdom were also used in medieval medicine. In his pharmacognosy Amirdovlat mentions the following invertebrates: sponge, jellyfish, worms (earthworm, silkworm, cochineal[14]), mollusks (telling,[15] sea hare,[16] octopus, cuttlefish, snail), insects (louse, flea, cricket, cicada, Spanish fly,[17] hide beetle,[18] dung beetle, locust, ant), crustaceans (crayfish, sea crayfish,[19]

14. *Coccus infectorius* L.

15. *Tellina sp.*

16. *Aplysia sp.*

17. *Cantharis vesicatoria* (syn. *Lytta vesicatoria.*)

18. *Dermestes typographus.*

19. *Cancer marinus* L.

sow bug[20]) and arachnids (scorpion, tick, phalanx) as well as some other species.

In *Useless for Ignoramuses,* various species of vertebrates are presented in far greater quantity: fishes (catfish, stargazer, red mullet,[21] herring, scomber, scorpion fish[22]), amphibians (frog), reptiles (snakes, adder, crocodile, marine turtle, tortoise, gecko, monitor lizard, skink, rough-tailed agama,[23] chameleon), birds (pigeon, turtle dove,[24] chicken, duck, goose, pheasant, partridge, bustard,[25] quail, swallow, kite,[26] falcon,[27] eagle,[28] crane, vulture, sparrow, starling, goldfinch,[29] wren,[30] peacock, ostrich, flamingo, pochard, ruddy shelduck,[31] and mammals (dog, cat, ass, horse, pig, bore, sheep, she-goat, gazelle, deer, bezoar goat,[32] cow, buffalo, camel, hare, musk deer, fox, bear, wolf, lion, hyena, tiger, snow leopard, monkey, sable, beaver, mole, weasel, bat, hedgehog, mouse, elephant, rhinoceros, narwhal).

As medicaments these were also used: brain, liver, stomach, spleen, lungs, trachea, testicles, udder, bone marrow, milk, meat, blood, fat, bile, musk, rennet extract from stomachs, castoreum, etc. Medicinal properties were also attributed to sweat, saliva, urine and feces of animals, and their skin, fur, bones, horns, hooves and ashes obtained by their incineration. Also very popular was a medicine prepared from moist (i.e., undegreased) wool (lanolin), containing the milky juice of

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20. *Oniscus asellus (Isopoda).*
21. *Mullus barbatus* L.
22. *Scorpaena scrofa* L.
23. *Stellio stellio* L.
24. *Streptopelia turtur* L.
25. *Otis tarda.*
26. *Milvus sp.*
27. *Falco ossifragus.*
28. *Aquila sp.*
29. *Carduelis carduelis* L.
30. *Troglodytes troglodytes* L.
31. *Sadorna ferruginea.*
32. *Capra aegagrus.*

Milkweed[33] and some other plants. "The author of this book says, that it (i.e., this medicine) is prepared artificially. Take wool from the fat-tail of a sheep, put it in a pot, and boil with water. And all oil gathers on the surface of the water. [Allow the pot to cool down], so it (i.e. lanolin) cools down and sticks together. That is a different kind of the 'moist wool.' And it is also said, that on tails of buffalo calves, there gathers juice of such plants that contain milky juice, like milkweeds. It (i.e., juice) is taken, boiled and allowed to thicken. And that is also one of the kinds of the 'moist wool'" [43:159].

The action of these medicines is very similar to that of propolis. There is the following data about propolis in the book *Useless for Ignoramuses*: "The author of this book says, that we tried it many times for bone fractures, fallings and bleedings. It exerts the same action as *mumie.*[34] And its dosage is 1 *dram.* It is warmed up with 10 *drams* of honey or sugar and imbibed. And it is said that propolis is the compound that [also] exists in honey" [43:388]. Contemporary researchers found that propolis, or 'bee glue,' is a mixture of high molecular weight organic compounds including resins, balsams, wax, vitamins, essential oils, flavonoids, pollen, as well as some inorganic elements: iron, manganese, silicon, aluminum, vanadium and strontium [70:194–200]. It is worth noting that some researchers also trace the origin of *mumie* to bees, speculating that it is a fossilized honey, and, according to other hypothesis, the product of wild honeybee [71:14]. The majority of scientists view *mumie* as complex natural mixture that contains products of the decomposition of various plants, hydrocarbons and animal excrements. Other compounds containing hydrocarbons, such as crude oil, asphalt, bitumen and ozocerite[35] were also used in medieval medicine, and were considered *mumie* substitutes.

Honey was recommended in *Useless for Ignoramuses* as an important foodstuff and, at the same time, as a medicinal compound with antiseptic, antitoxic and tonic properties. In medieval medicine, honey had to meet several requirements: "The best kind of honey,"

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33. *Euphorbia sp.*

34. Mumie [*mumiyo*]—mountain wax. It can be found in mountainous caves in various countries—Iran, Afghanistan, Central Asia and Armenia. It possessess tonic, wound-healing and antitoxic properties.

35. Ozocerite—mineral wax.

wrote Amirdovlat, "is considered the sweet and clear one, with a pleasant aroma and good taste, [the one] with a white color. They also say, that the honey of reddish tint is also good, [the one] of spring and summer. And [the honey] of winter and autumn is not good. . . The good honey is the one that honeybees are taking during the most favorable time [of the year]" [43:379].

Ambergris, the product of whale intestinal secretion, also possesses tonic and strengthening properties. Amirdovlat wrote: "And I, the unworthy servant, heard, [researched] and wrote a little about ambergris. May you know, that there are islands in the Indian Ocean, and there are mountains on those islands, and on those mountains—round crevices, in which honeybees nest. And, over time, a lot of honey is accumulated [there]. And during [some] summer days, it melts under the heat of the sun, and runs down into the sea. Honey, when it hits the water, dissolves, but wax bobs to the sea surface, for it is light. And sea cows[36] swallow it. When it descends into their stomachs, it is not digested, but goes outside. And again it does not lose its wax properties, and remains on the sea surface. And fish swallow it and die. And the dead [fishes] are washed ashore. [People] come collect them and take the wax-like substance from their bellies. That is ambergris" [43:393]. One more medicinal substance, the origin of which, in medieval times was attributed to honeybees!

In the east, the antitoxic properties of 'the goat stone,' or *bezoar*, were very highly prized. *Bezoar* was obtained from intestines of *bezoar* goats,[37] a species of Armenian fauna. Its formation, according to Amirdovlat, is linked to the type of food eaten by these animals. In *Useless for Ignoramuses* it is said: "The goat stone, named *bezoar*, is formed [in stomachs] of wild fallow-deers. And when it is ground, seeds and parts of Common Toadflax[38] and branches are found in it. The *bezoar* is formed there in the course of many days and gradually enlarges and grows. And they say that only snakes and Common Toadflax serve as food for these fallow-deers. And it possesses the properties of *teryak*"[39] [43:372–373]. Common Toadflax was considered

36. I.e. Steller's sea cow (*Hydrodamalis gigas*).

37. *Capra aegagrus*.

38. *Linaria vulgaris* Mill.

39. *Teryak*—another name of *bezoar*.

an antivenom for snakebites (its Arabic name is *mukhalissa*, literally meaning 'saving,' 'delivering'). As far as the inorganic components of the *bezoar* stone are concerned, they are mostly represented by calcium hydrophosphate, molecules of which are equal in size to molecules of calcium hydroarsenate—one of poisonous arsenic compounds. Therefore, calcium hydrophosphate easily exchanges its phosphate for arsenate, binding hydroarsenate and rendering arsenic, one of the most widespread medieval poisons, non-toxic.

In Amirdovlat's pharmacognosy there are described a variety of inorganic medicines, such as metals: gold, silver, copper, iron, tin, lead, mercury; non-metals: sulfur; amphoteric elements: arsenic, antimony; inorganic compounds: haematite, green vitriol ($FeSO_4$), yellow vitriol [$Fe2(SO_4)_3$], blue vitriol ($CuSO_4$), magnetite ($FeO{\cdot}Fe_2O_3$), pyrite (FeS_2), minium,[40] white lead, galena (PbS), zinc oxide (ZnO), cupric oxide (CuO), litharge (PbO), verdigris [$Cu(CH_3COOH)_2$], malachite [$CuCO_3{\cdot}Cu(OH)_2$], chrysocolla ($CuSiO_3{\cdot}nH_2O$), white arsenic (As_2O_3), red arsenic (As_2S_2), yellow arsenic (As_2S_3), vermilion, saltpeter,[41] borax, antimony glance (Sb_2S_3), potash, quick lime (CaO), table salt, baking soda (Na_2CO_3), *sal ammoniac* (NH_4Cl), alum, ostracite ($CaCO_3$), gypsum, pyrolusite (MnO_2).

Silicon compounds, such as silicates and alumosilicates, are a part of clays (Armenian clay, seal-clay, etc.), as well as mica, talcum and glaze, all of which were used in medieval medicine. In *Useless for Ignoramuses*, precious and semi-precious stones were also described, to which medicinal properties were often attributed: diamond, sapphire, lazurite,[42] pearl, amethyst, emerald, turquoise, rock crystal, sard, amber, jet, onyx, coral, jade, selenite, moon stone, snake stone or serpentine, and eagle stone or aetite. Apart from these well known stones, Amirdovlat also mentioned many others, the names of which are forgotten or even unknown nowadays: "Assian stone, Frigian stone, Judeaic stone, Coptic stone, Ethiopian stone, Thracian stone, milky stone or galactite, honey stone or meletite, nipple stone, grind stone, sponge stone, leopard stone, bull stone, pigeon stone, fish stone, dog

40. Red lead.

41. Nitre.

42. Lat. *lapis lazuri*.

stone, marine stone, Barka stone, Pavel stone, Indian stone, stone of shoemakers and stone of dyers," etc.

In *Useless for Ignoramuses,* the information about simple and complex inorganic compounds many times exceeds the information that is given in similar works of scientists of the Cilician school, in particular in such works of Mkhitar Heratsi as *On Precious Stones and their Healing Properties*, and in the book by Ishokh, *The Book about Nature* (thirteenth century). This could serve as a testament to an ever-increasing development of mineralogy in medieval Armenia that created an excellent opportunity for development of chemotherapy. Amirdovlat described methods for preparation of certain metals (mercury, zinc, lead) and their oxides from ores that underwent roasting. In the chapter dedicated to lead he recommended the following method for preparing a medication against skin rash: "Thoroughly pulverize and put in a jug a layer of lead and a layer of sulfur, until the jug is full, and put [the jug] on fire, in order for it (i.e. jug's content's) to burn and a flame to appear, mix with iron and leave [till] it turns into an earth-like mass" [43:71].

A method of sublimation was described in the chapter dedicated to mercury: "The author of this book says that there are many methods of mercury sublimation. But we will point out [only] one. Take mercury and [add] a half of its (i.e., mercury's) dose, lead or tin, mix and grind, so the mixture would look like burned vitriol. Pulverize an equal amount of roof tile and mix with it (i.e. mixture), and also add an equal amount of annealed salt. And pulverize all this on a marble slab. Add some Dock[43] juice and grind tenderly until completely soft, and then anneal and put it in a bottle. Seal the bottle's neck with clay, or put in a new jug and seal the lid with clay, [then] put on a fire, [then] take from the fire and grind with Dock juice again. Do this six [or] seven times, and then grind, pour in a bottle and seal the lid with clay. And do the sublimation three times, till mercury becomes as white as a pearl" [43:151–152]. Describing the method of mercury sublimation, that was developed by Arabian scientists, Amirdovlat used the Arabic term *tas'id*, common to Arabic alchemical literature.

Medieval chemistry evolved from alchemy, borrowing from it its terminology and methods of isolation, synthesis and analysis of

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43. *Rumex sp.*

compounds. The following words were attributed to a woman-alchemist named Maria: "When you read in your books about roasting, pulverization, grinding or sublimation, may you know that all these methods serve to macerate elements in their water" [72:181, 261].

According to alchemical theory, mercury played an important role in the origins of an inorganic world, in particular, metals and precious stones. Ishokh said in *The Book of Nature*: "The first Creation of Nature—mercury and sulfur, are created with the help of the sun; first mercury [is formed], and from its smoke—sulfur, and, from them, all of the above-mentioned" [73:40]. Along with common names for mercury (Armenian *sndik*, Arabic *zibaq*, Persian *jiva*), Amirdovlat also used a whole array of cryptic alchemical ones: 'mediator' (Arabic *simsar*), snake (Arabic *khayya*), 'eye' (Arabic *al-'ain*), 'water' (Arabic *al-ma'*), 'fugitive' (Arabic *al-fārrar*), 'spirit' (Arabic *al-rūkh*), etc.

In contrast to *The Tabular Dictionary*, which contains a lot of references to ancient and eastern authors, in *Useless for Ignoramuses,* Amirdovlat, while describing all these medicines, more often refers to his own experience, at times even arguing with distinguished scholars of medicine. In the chapter dedicated to the honey unction, which Dioscorides and Ibn Sina considered to be an exudate of some exotic trees, Amirdovlat wrote: "And I, the unworthiest of physicians, will keep the opinion that this unction is secreted by a Fir tree"[44] [43:35]. Or, while presenting some sayings of the author of *Badiya's Ikhtiyarat* concerning the fact that lichen grows "on Oaks, on Fir trees, as well as on Hazelnut tree," Amirdovlat argues: "And I, God's unworthy servant, noticed that it grows on the ground" [43:95].

Arguing the opinion of some authors about the fact that pulverized diamonds possess toxic properties, Amirdovlat wrote: "I saw a man who ate it and did not die" [43:37]. Al-Biruni conducted the following experiment on a dog: "In my presence a dog was given a drink [with pulverized diamond] and that did not affect [the dog] neither immediately [after imbibing a drink], nor later" [74:85]. Amirdovlat also referred to his own experience with the antitoxic properties of seal-clay: "In my presence a one year old child ate two *mtkhals*[45] of arsenic, and after one hour he [was given] some of this clay. He vomited

44. *Picea abies* L.

45. 1 *mtkhal* = 4.414 g.

everything he had eaten. And then, [after] he was given some of his mother's milk, he vomited again and moved his bowels once. And thus he was saved from the poison" [43:126]. Arguing the opinion about poisonous properties of adder's bile, he wrote: "I saw a man catching snakes. He ate snake's bile, after having caught [the snake], and nothing happened to him. This person, the snake hunter, said to me: "Such is my occupation, I always eat it, but it can not harm me" [43:345]. By the way, Amirdovlat's opinion is contrary to Ibn Sina's, who considered snake bile "one of the poisons, which, if imbibed in order to kill, will cause one faint after another, and medicines rarely help" [11:4:451].

Amirdovlat always expressed great interest in toxicology. He wrote about Common Toadflax[46]: "I saw a man, who drank one *mtkhal* of this medicine, when the sun entered the house of Aries, and during this year he was given deadly poison many times, but they did not harm him" [43:372]. Amirdovlat also noticed that certain medicinal compounds increased the toxicity of poisons: "The author of this book says, that [he] once saw a woman who ate some Parsley leaves and was stung by a bee on the same day, [and] less than one hour later she was dead. . . And pregnant women should also avoid eating Parsley" [43:592].

About Pithyusa[47] Amirdovlat reports the following results of his observations: "The author of this book says, that if a cow will eat it, [the cow] will die in that very instant, and if a sheep will eat [this milkweed], it will survive, and [this milkweed] will not do [the sheep] any harm. If lichen[48] is anointed with its milky juice, dry or fresh, that helps. That was [successfully] tried many times" [43:432]. Describing Perennial Pepperweed,[49] Amirdovlat spoke in favor of its Indian variety, rather than Persian, for the latter possesses an irritating effect on skin: "We have tried [the Persian variety] and found that if the skin is anointed with its fresh [juice], it will immediately cause blisters to appear on the very same spot. And Indian [variety] does not cause

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46. *Linaria vulgaris* Mill.

47. *Euphorbia pithyusa* L.

48. Certain kind of skin disease.

49. Perennial Pepperweed or Tall Whitetop—*Lepidium latifolium* L. (*Brassicaceae*).

[them to appear]" [43:429]. Describing *nurvak,*[50] "or root of infertility," Amirdovlat wrote that its properties were not known neither to Ibn Jazla, nor to Ibn al-Baytar. Defending his views, the Armenian *bzhshkapet* dared to criticize these distinguished scholars on many occasions. He entered into polemics with Ibn Jazla concerning the toxic properties of Azadrakht[51] fruit: "The author of the *Minkhach* said that they are poisonous. We have tried [them], and found that this is not true. Its fruit has a slightly sweet taste. And the author of the *Minkhach* said that they are very bitter, but that is [also] false" [43:34]. Ibn al-Baytar also pointed out certain mistakes made by Ibn Jazla. Amirdovlat quite often disagreed with other famous authors, such as Rhazes, as well as al-Ansari, the author of *Badiya's Ikhtiyarat.* He questioned the opinion of these two authors about the origin of 'eagle stone' or *Lapis aetites*, which they mistakenly identified as "Indian tree" or "Indian nut." Amirdovlat continued this discussion in the chapter dedicated to Indian nut[52]: "They say that it is an 'eagle stone,' but this is not right. The author of *Chameh* (Rhazes) said, that this is a seed of an Areca[53] palm. But that is not true as well. And the author of this book had said and determined that it is an 'Indian bean'" [43:85].

The Armenian *bzhshkapet* never blindly believed authoritative sources, always trying experimentally to verify their statements. In *Useless for Ignoramuses* he described the following method for treating arthritis with Horehound[54]: "Dig a pit in the ground as deep as a human's height, put some sand on its bottom, and burn a fire until the pit is hot, and then, put the fire out, and on its place put some of this grass and lay down the patient, which can not move, and cover him with the same grass and [also] some clothing [on top of the grass]. And he must lie [there] until the pit is warm, and then [the patient] will raise on his feet with God's mercy, whole and unharmed" [43:612]. At the end of the chapter Amirdovlat also added: "I myself tried this with God's help."

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50. *Nurvak* (Persian *narūk*)—medicinal root with contraceptive properties. The exact botanical identification is not established.

51. *Melia azadirakhta* L. (*Meliaceae*).

52. *Caesalpinia bonducella* Roxb.

53. *Areca catechu* L. (*Palmae*).

54. *Marrubium vulgare* L.

Sometimes he even challenges Dioscorides's opinions: "Dioscorides said that the best kind of Ebony[55] is the one brought from Abyssinia. And I am surprised with his words, for there is no ebony in Abyssinia, but this ebony is brought from Isfahan and Fuvakh[56]. Its is also brought from the island named Ghamir[57]" [43:67].

In *Useless for Ignoramuses* we can see the author's independent approach in describing many phenomena, as well as an excellent presentation of material, based upon his own experience and a knowledge of ancient sources. Amirdovlat Amasiatsi possessed a truly encyclopedic knowledge of various areas of pharmacology, toxicology, medical botany, chemistry and zoology.

55. *Diospyros ebenum* Koen. (*Ebenaceae*).

56. Madagascar.

57. Comoro Islands.

Amirdovlat Amasiatsi: Botanist and Geographer

Analysis of the botanical information in the *Useless for Ignoramuses* contains a lot of material for historians of botany and geography interested in Armenia and the Orient. The book gives to a contemporary scholar a unique possibility to see through the eyes of a medieval botanist and geographer the flora of the vast Armeno-Iranian, or Irano-Anatolian floristic province, which includes the arid and subarid regions of Armenian, Asia Minor and Iranian plateaus [75:7]. In *Useless for Ignoramuses,* Amirdovlat Amasiatsi described more than a thousand species of plants of this region, as well as many plants from the neighboring floristic provinces (Caucasian, Turanic, Balkan).

Armenian flora comprises many interesting kinds of plant life including halophytes, gygropytes, psammophytes, ephemeric and many other formations that include many rare and endemic species belonging to the *Red Book.* The fate of some of these plants which are described by this medieval Armenian botanist of the fifteenth century could be traced up to the present. The brief, but at the same time expressive and scientifically correct botanical descriptions in the book *Useless for Ignoramuses* make it possible to form a correct opinion about external characteristics, morphology, ecological characteristics as well as medicinal, and nutritional uses of the many plants. The majority of descriptions are based on analogy. So, for example, about Gromwell[1] that grows around ancient burial sites in Armenia, Amirdovlat wrote: "It has white seeds that resemble silver. And its leaves resemble leaves of the Olive tree. But they are longer and more flat. It grows on high rocky places. And its stems are long and thin. And on each stem there are small leaves, just like [leaves of] Couch-grass.[2] And under each leave there is a tough and round seed, that looks like a small pebble" [43:306–307].

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1. *Lithospermum officinale* L. (*Boraginaceae*).

2. *Agropyron repens* Beauv. (*Poaceae*).

Description of Hog's Fennel[3] sounds even more convincing: "This is a plant, whose stem and leaves resemble Fennel. It has a multitude of little hairs. And on its top there is a flower. Its root is black, and the smell is heavy; and its top is sticky. It grows in the mountains and shady areas" [43:306–307]. Nowadays, *Peucedanum luxurians* Tamamsch., as well as *Peucedanum caucasicum* (Bieb.) C Koch. and *P. zedelmeyeranum* Manden., from Armenian flora, are considered to be extremely rare umbeliferous[4] plants [77:11]. Another such plant is Dorema,[5] that produces a resin that was widely used in medieval Armenian phytotherapy. At the present time this species is almost completely extinct [78:40]. In *Useless for Ignoramuses* there are also described several other producers of resins from the *Apiaceae* family: *Ferula persica* Willd. and *Opopanax persicus* Boiss., that, thanks to their medicinal properties, were relentlessly exterminated in the course of many centuries, and now belong to the category of rare plants of Armenian flora.

The same fate also awaited plants from the *Cucurbitaceae* family that were described in Amasiatsi's book. Among them are *Bryonia alba* L., and *B. dioica* Jacq., whose area has recently dramatically decreased. Nowadays yet another species, Squirting Cucumber,[6] became comparatively rare, as well as a very interesting plant named Colocynth[7] which is an element of the Saharan floristic province. The latter was only recently rediscovered in the Megri region of Armenia.

Such floristic discoveries confirm scientific validity of the information presented by Amasiatsi. This and many other species described in *Useless for Ignoramuses,* which were for a long time considered extinct in the region, were rediscovered again, thanks to the tireless efforts of botanists, earning Armenia a title of a wonderland for botanical discoveries [79]. In addition to that it is worth mentioning Sweet Flag,[8] a plant, formerly very common in the Ararat valley, and

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3. *Peucedanum officinale* L.

4. *Apiaceae.*

5. *Dorema glabrum* Fish. et Mey.

6. *Ecballium elaterium* (L.) Rich.

7. *Citrullus colocynthis* Schrad.

8. *Acorus calamus* L.

then overcollected to extinction because of its root's medicinal properties. In recent years it was found again in the Echmiadzin area. Interestingly enough, this plant was very scarce in Armenia during Amirdovlat's time, and was mainly imported there from other countries. It is said in *Useless for Ignoramuses*: "This is a root of a plant that is brought from India. It looks like Lizard Orchid.[9] It is of white color, and there are black dots on it. And it has a slightly bitter taste" [43:35–36].

Therefore, the process of extinction of Armenian medicinal plants began many centuries ago. As a result of that, the whole array of species that were described in Armenian medicinal literature before Amirdovlat, were not even mentioned in *Useless for Ignoramuses,* for example the plant named *hamaspyur.* The latter was identified with one of the species of the genus *Lychnis* L. With the recent discovery of certain extremely rare species of this genus (*L. flos cuculi* L. and *L. coriacea* Moench.) in Armenia there is a hope that the legendary *hamaspyur* will eventually be rediscovered and identified [80].

Among medicinal plants mentioned in Amirdovlat's book and recently rediscovered in Armenia, there is Common Toadflax[10] [80]. In *Useless for Ignoramuses* there is a quite precise description of this plant (with the exception of the leaves): "This is a plant whose leaves look like Parsley. And [its] flower resembles a scorpion... It grows in [wastelands]. And its seeds are small, and the flower is white with a yellowish and blackish hue" [43:372]. Apart from Common Toadflax, two more species with different ecological setting and reddish flowers are described there (one grows in mountainous, rocky areas, and another on riverbanks).

In medieval Armenian pharmacognosy there exist data concerning a whole array of plants from the arsenal of folk medicine, which even nowadays are widespread in Armenian territory. The following description of Thyme,[11] a plant that was well known to Amirdovlat, sounds quite convincing: "Its stems are slender, and flower is white or reddish. It grows in the mountains and on high elevations, on mountaintops and in valleys. Its stems are slender like [stems of] Rush,

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9. *Orchis hircina* Lindley (*Orchidaceae*).

10. *Linaria vulgaris* Mill.

11. *Thymus kotschyanus* Boiss. et Hoh.

and the leaves look like [leaves of] Poley[12] and Wild Mint" [43:237]. Amirdovlat also noted polymorphic changes in this plant depending on growing conditions, which has been confirmed by contemporary research: "The author of this book says, that Thyme quite often turns into Mint, [when this plant] changes the place where it grows" [43:409].

Among endemic plants of Armenian flora, described in *Useless for Ignoramuses,* relict plants, that grew for millions of years on Tertiary red clays that spread from Jervez canyon near Yerevan up to the village of Marmarashen, present special interest [75:19]. These clays are rich in iron compounds and contain oxides of manganese. Plant formation that grows on these clays and known under the name of ephemeric-galyatic formation, includes a whole host of ancient species of Wild Wheat, from which produced all the cultured varieties of Wheat. It is not surprising that N. I. Vavilov considered Armenia one of the most ancient places of origin of cultured plants. Apart from species of Wild Wheat—*Triticum boeoticum, T. urartu, T. araraticum,* etc., with strong intraspecific polymorphism, there are also found such species of Nigella as *Nigella oxypetala* and *N. sativa,* Chamaesyce Milkweed,[13] Red-Horned Poppy,[14] Chicory,[15] Ironwort,[16] Milk-Vetch,[17] Fenugreek,[18] and some other species described for this floristic region by Amasiatsi [81].

Among Tertiary relicts of Armenian flora, Yew[19] must also be mentioned, since its area nowadays has a tendency to shrink [78:169]. Amirdovlat wrote: "I found this plant in Constantinople. It grows [there] in gardens, and also [in the wilderness] among rocks, but if [it is dug up] with [its] root, and planted in other place, then it will not grow, but if its branches are cut and [then] planted, then it will grow" [43:144]. The latter comment makes us remember one of Amirdovlat's

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12. *Teucrium polium* L. (*Lamiaceae*).

13. *Euphorbia chamaesyce* L.

14. *Glaucium corniculatum* Curt.

15. *Cichorium glandulosum* Boiss. et Hoh.

16. *Sideritis montana* L.

17. *Astragalus arnacantha* Bieb. (*Fabaceae*).

18. *Trigonella elatior* Sbth. (*Fabaceae*).

19. *Taxus baccata* L.

honorary titles at Muhammed Fatih's court—*bostanji-pasha*, which is usually interpreted as 'the chief of bodyguards,' but literally also means 'the chief of gardeners.'

In Amirdovlat's pharmacognosy medicaments from Armenia, Balkan Peninsula, Asia Minor, Iran, and all other countries visited by Amirdovlat, are described. Apart from that, his pharmacognosy contains information taken from ancient and eastern sources on medicinal flora, fauna and minerals, as well as stories told by travelers and merchants about many remote countries, such as the Pyrenean Peninsula, Northern Africa, Arabia, India, Afghanistan, Central Asia, China, the islands and coastal areas of the Mediterranean, the Black, Aegean and Red Seas. Therefore, in medieval Armenian pharmacognosy were used medicinal plants from many countries of Eurasia and Africa, which were long known as suppliers of spices, incense and medicinal plants.

Despite the fact that Armenia was not a sovereign state in Amirdovlat's time, becoming an apple of discord between the tribes Ak-Koyunlu, Kara-Koyunlu, and Ottoman Turkey, its former glory as a country with rich medicinal resources was well remembered. These endless wars lead to stagnation in trade, and busy caravan roads that crossed Armenia went into oblivion. Marvelous medicinal gardens and flower conservatories, that were cherished in the times of the Artashesids, Arshakids, Bagratids and Rubenids,[20] were abandoned and never mentioned in Armenian chronicles of the time.

In *Useless for Ignoramuses* some areas and cities of historical Armenia that were not mentioned were famous for their medicines when Ani was flourishing. Armenian clay quarries near the city of Ani, the Bagratid capital, described even by Ibn Sina in his *Canon*, were abandoned in fourteenth-fifteenth centuries. The same is true for the city of Ani itself, which at this time lost its former glory. Among the famous ancient cities, Amirdovlat mentioned only the city of Yerzinka in Upper Armenia, which was formerly the center of worship of the pagan fertility goddess Anahit, the patron of the Armenian state. This goddess, together with the goddess Astghik, was considered the goddess of good health, like Egyptian Isis [8:1:51]. In the paragraph on "Golden

20. Artashesids, Arshakids, Bagratids, Rubenids are names of Armenian royal families.

Tree" it is said that it grows not only in Persia, but could also be found near the city of Karin (city of Erzurum) [43:137]. The famous borax quarry near the ancient Armenian city of Salmast (which later was annexed by Iran) is mentioned in another paragraph [43:167].

In *Useless for Ignoramuses* there are also mentioned many cities of Cilician Armenia—its former capital city Sis, and the city of Tarsus, both of which were flourishing cultural centers a hundred years prior to Amirdovlat's time, and were later apparently deserted [43:97]. Amirdovlat's native city, Amasia, was rarely mentioned in the book, only when he described especially large specimens of sheatfish[21] (many dozens of pounds), that were abundant in Amasia's rivers [43:319]. Amasia and its surroundings are described in *The Geography* of the Strabo, who was born there. Ancient silver and gold mines were located there. The city was famous for its mild healthy climate, marvelous spring water, fragrant apples, grapes and Quince [9:514, 526].

A general view of historical Armenia can be obtained from concrete descriptions in Amirdovlat's pharmacognosy. He calls it "our country" or "Armenian country," as well as "the country of Hayk" (after the legendary giant Hayk, progenitor of all Armenians), a country famous for its medicinal plants and fruit trees, especially the Armenian Apricot tree, that was called by ancient authors "Armeniaca," as well as the precious minerals (lazurite, chrysocolla, borax, etc.). Unfortunately, Amirdovlat was not always explicit about certain geographic locations where particular medicines were found, especially when common representatives of the plant and the animal kingdoms were mentioned. A brief statement like: "It is [well] known" occurs frequently. Amirdovlat, who was well informed about the dietary customs of his people, wrote in the paragraph on *apukht* (a special kind of dried meat): "And in our country they dry and store the beef and lamb for years. And we met people who told us that in Georgia this dried meat withstands twenty years of storage" [43:69].

For many years Amirdovlat studied the properties of medicinal plants of the Balkan Peninsula, especially the flora of Constantinople and its surroundings. It is said about Aconite[22] in *Useless for*

21. *Silurus glanis*.

22. *Aconitum anthora* L.

Ignoramuses: "It grows in the country of Byzantines[23], in Macedonia, in Constantinople's surroundings and on the shores of the Black Sea. I, god's unworthy servant, found it in the village, named in the Byzantine language, Terkoz, near Constantinople," [43:322]. Constantinople was also mentioned in conjunction with yellow ochre, which was mined nearby and often used as a substitute for seal-clay. It is possible that it was yellow ochre that was brought back by an expedition, organized by Mohammed Fatih for the purpose of searching for seal-clay. A team of experienced physicians, among which was possibly also present the chief-physician Amirdovlat, who actually discovered this mistake.

Amirdovlat wrote his book *The Benefits of Medicine* in the city of Philipopolis, situated on Balkan Peninsula. This city was remembered in conjunction with the great Roman physician Galen, who traveled extensively in the area and visited the city fourteen centuries before Amirdovlat's time. Amirdovlat cites Galen's description of the voyage: "And I, Galen, wanted to know how they mix and how much they take of this [seal] clay and how much of [goat's] blood. This desire would not leave my heart. I wanted to go there myself and to see that island and [to find out all about] this clay. I traveled [first] to Cyprus, for I had some people there who depended on me, whom I had to see. And without idling I went to Lemnos. Let's talk briefly [about this voyage]. So, I went to Antiochia, and then got to Macedonia, visited all cities there, I then went to the city of Phallinis (Philipopolis) and stayed there, and then reached the seashore. And from that city to the seashore the distance is, on the average, 120 miles. And here I embarked on the ship, traveled for 200 miles and reached the place called Phasus[24]. And from there I traveled another 700 miles and reached the island named Lemnos. And from this island to Alexandria [there is a distance of] 700 miles. I am not mentioning the island and the distances for no purpose, but if one would want to see this island, [one could] travel the same route as I [did]" [43:123]. We do not know if Amirdovlat followed the route of Galen's voyage, but he, probably, possessed such an intent. Among Greek islands, he also knew Samos, the place of origin of the famous Samos Clay, and Chios, from where the famous Chios Clay was

23. I.e., Byzantium.

24. The Island of Phasos, in the Aegean Sea.

imported. The Island of Chios was also called Mastic Island, for there grew a Mastic Tree,[25] the producer of mastic.

Amirdovlat also occasionally mentioned ancient Greece, and more often, Byzantium, which he called "the country of the Byzantines." According to the medieval geography, the country of the Byzantines also included both Rome and Rume. While talking about the Island of Socotra, on which Aloe[26] was cultivated, he presents the following information: "It is said that Socotra is an island, situated near Yemen's coast. The distance to this island is 40 *farsangs*.[27] And all the inhabitants of the island are heathens and sorcerers, and possess tremendous power. At first they used to live in the country of Byzantines. But Alexander the Great expelled them from this country to that island, so that they would populate it and prepare *sabur*[28] there" [43:519]. From the context, we can see that "the country of Byzantines" is, in this case, ancient Greece.

In Amirdovlat's pharmacognosy he mentioned medicines brought from the regions of Shemakh and Shirvan, situated on the Caspian seashore in the vicinity of the Armenian land. From the juice of the Red-Horned Poppy[29] they prepared there a famous Bush of Derbent,[30] also called Armenian Bush—the proven medicine for gout [43:483]. There was a *gagat*[31] deposit near Derbent. The Shirvan region was famous for its *bezoar*.[32]

Among all the countries visited by Amirdovlat, Iran, and particularly the Iranian City of Shiraz, were mentioned especially often in *Useless for Ignoramuses*. In Shiraz's surroundings, Amirdovlat found Pandanus,[33] whose juice was considered helpful against leprosy and

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25. *Pistacia lentiscus* L.

26. *Aloe vera* L.

27. 1 *farsang* = 6 kilometers.

28. *Sabur* (arabic *sabr, sabir*)—dried juice of *Aloe vera* L.

29. *Glaucium corniculatum* Curt.

30. *Bush-y Darbandi* (arab.)—dried juice of Red-Horned Poppy (*Glaucium corniculatum* Curt.).

31. Corrupted name of Arabic "*hadjar al-gagatis*"—Lat. *lapis gagates*.

32. Compound obtained from the intestines of *Bezoar* goats (*Capra aegagrus*).

33. *Pandanus odoratissimus* L.

other skin diseases [43:589]. Amirdovlat gives interesting information about finding *bezoar* near Shiraz: "The author of this book says: 'In my days, in one of the villages of Shiraz region was found *bezoar*, and in this region there were many fallow deer,[34] and they used to rest peacefully in the evenings. And humans that were nearby, discovered *bezoar* there. In this region there was found a lot of *bezoar*, and it helped all ailments'" [43:373].

Among other Iranian cities the following were also mentioned in *Useless for Ignoramuses*: Khorasan, Gurgan, Darabjird, Isfahan, Ized, Kerman, Nikhavend, Sistan, Tabaristan, Tabriz, Hamadan, Shahrez. In the Iranian mountains, according to *Useless for Ignoramuses,* a variety of manna, called 'dry honey' was found, which surpassed honey in its medicinal activity. Crude oil, one of Iranian natural treasures, was also used medicinally. Amirdovlat wrote: "It occurs in the country of Persians. It can be black and white. The best kind is the one that is white and pure. The nature of crude oil is hot and dry in the fourth degree. It helps in the cases of deafness, ringing in ears, paralysis, toothache and diseases of nerves of the cold nature... We saw paralyzed [people] who took it and were cured" [43:409–410].

While traveling abroad, Amirdovlat paid attention not only to native species, but also to how non-indigenous species acclimated there. In the paragraph written about a plant named Persea,[35] he wrote: "It is a large tree. It grows in Persia. It was [exported] and grown in Egypt. Its fruits are edible" [43:195]. Amirdovlat provides a lot of data on flora and fauna of Egypt and countries of Northwestern Africa, but it is not known whether he had actually been there or just used data of other authors. In *Useless for Ignoramuses* species of local flora are also described: Acacia,[36] Balsam tree,[37] etc., along with plants common not only to Egypt and Armenia, but also to many countries of Europe and Asia: Hyssop,[38] Nut Grass,[39] etc.

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34. *Cervus dama.*

35. *Mimusops schimperi* Hochst.

36. *Acacia arabica* Willd.

37. *Commiphora opobalsamum* Engl.

38. *Hyssopus* L.

39. *Cyperus* L.

Among Egyptian cities, the ancient city of Ayn-Shams, where the Balsam tree grew, that produced a curative balsam, is also mentioned. "There, where the Balsam tree grows, there used to be the Pharaoh's garden, in which there was a well named Ayn-Shams. And this Balsam tree is one of Moses' miracles" [43:560]. In the paragraph about the Armenian plant Nut Grass, there are data on its area: "These are small roots that look like hair. They are known in Damascus and Egypt, and also grow in Antiochia. And women use them for growing hair" [43:521]. Among representatives of Egyptian fauna, the Nile crocodile is described, whose blood and internal organs were used in medieval medicine as a tonic and aphrodisiac [43:510–511]. A lot of medicines were brought from Egypt, among them 'clay stone,' ostracite, Egyptian clay, 'Memphis stone'; from upper Egypt, or from the "country of Said"—rock crystal; from the Maghrib—euphorbium, sandarak, selenite, slate; from Abyssinia—'Ethiopian stone,' as well as ebony (however, according to Amirdovlat, this statement of the authoritative sources was dubious).

The medicinal flora of Mesopotamia was also well known to Amirdovlat. Many kinds of crude plant drugs were often exported from the cities of Mesopotamia: Amid, Baghdad, Mosul, Basra. The region's two great rivers, Euphrates and Tigris, are mentioned in *Useless for Ignoramuses* in conjunction with description of the Stargazer fish,[40] which lives in their waters. The bile of this fish was considered helpful in cases of an early cataracts [43:344].

According to Amirdovlat, in Jerusalem and its surroundings as well as in the mountains around the city, there grew many medicinal plants. It is said about Hyssop[41] and Clover Dodder,[42] which are common to Armenian flora, that "the best kind is that which grows in the mountains of Jerusalem" [43:159].

In medieval medicine, Arabian medicinal plants, resins, animals and minerals were very famous. Amirdovlat mentions the Arabian cities of Medina and Mecca, regions of Yemen, Oman, and Hijaz, and the Sea of Hijaz (Red Sea). In medieval geography, the latter was also called

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40. *Uranoscopus scaber.*

41. *Hyssopus officinalis* L.

42. *Cuscuta epithymum* Murr. (*Cuscutaceae*).

'the Sea of Kulzum.' Sard, diamonds, alum, and 'fragrant nails'[43] were brought from Yemen, Cistus[44] comes from Oman. On the island near Oman, there grew the Dragon tree[45] that produced a resin named Dragon's blood,[46] which was used to treat tumors, ulcers and bleeding [43:556]. Senna[47] and Camel's Hay[48] were brought from Mecca. According to Amirdovlat, there were rich deposits of amethysts near Medina [43:331].

No country could surpass India in richness of natural resources. India supplied many countries, including Armenia, with medicinal plants, spices, incense and precious stones. In *Useless for Ignoramuses* there were mentioned many Indian provinces and cities: Sind, Bengal, Kulon, Mandala, Multan, Calcutta, as well as the Indian Ocean (which was also called "the Indian Sea" and "the Green Sea") and its shores. The following crude plant drugs were brought from India: the wood of the Aloe Tree, Acorus, Dogbane,[49] Embelia,[50] Indian Water Lily,[51] Malabathrum Cinnamon,[52] Spikenard,[53] Cubeb,[54] Isora,[55] fruits of Areca Palm,[56] Golden Shower Tree,[57] Zedoary,[58] Indian Aconite,[59] Pandanus,[60]

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43. Lat. *ungues odorati*—shells of a mollusc *Strombus lentiginosus*, used as aromatic incense.

44. *Cistus ladaniferus* L.

45. *Dracaena draco* L.

46. Lat. *sanguis draconis*.

47. *Cassia acutifolia* Delile.

48. *Andropogon schoenanthus* L.

49. *Apocynum erectum* Vell.

50. *Embelia ribes* Brum. (*Myrsinaceae*).

51. *Nymphaea sp.*

52. *Cinnamonum citriodorum* Thwait. (*Lauraceae*).

53. *Nardostachys jatamansi* DC.

54. *Piper cubeba* L.

55. *Helicteres isora* L.

56. *Areca catechu* L.

57. *Cassia fistula* L. (*Fabaceae*).

58. *Curcuma zedoaria* Rosc. (*Zingiberaceae*).

59. *Aconitum ferox* Wall.

and Black Pepper. Concerning Zedoary, which was considered an antidote for Aconite poisoning, Amirdovlat wrote: "In India there is a high mountain, which is called Gharachil (Himalayas?). This is a big mountain, on one side of which there is India, and on another—China. And this plant grows on that mountain. . . The root of this plant, which is called Zedoary, is an antidote for it (Aconite). They both grow in the same place. And if Zedoary grow near Aconite, then it neutralizes its harmful action. And dwellers of these places eat this Aconite and do not feel any harm" [43:320].

Chinese medicinal plants were very popular in medieval times. Camphor,[61] Rhubarb, Ginger, China Root,[62] and some other plant medicines, as well as animal-derived and mineral-derived medicines from the *Chin* or *Khtay* country (names for China in medieval Armenian geography) were thoroughly described in Amirdovlat's book.

While speaking about Chinese musk, which possesses antitoxic and tonic properties, Amirdovlat wrote: "And may you also know that it is a very long way from China, and they (i.e., sailors) go by sea, and the musk gets damp, and gets affected by opposing winds, and its power diminishes" [43:368]. Musk that was brought from Tibet was much more precious, for it possessed much stronger activity, because "Tibetan deer feed on Spikenard and Bahman,[63] [while] Chinese [musk deer] feed on other grasses." Apart from that, Tibetan musk was apparently transported not by sea, but by land, and its medicinal properties were better preserved.

As can be seen, matters of medicinal botany, geography and pharmacognosy were closely intertwined, which made it important for the medieval pharmacognosist to be well versed in climatic and natural conditions of many countries, from which crude drugs were exported. Such data may prove to be very helpful nowadays in studying many problems dealing with plant resources of those regions, as well as in

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60. *Pandanus odoratissimus* L.

61. Lat. *camphora officinarum*—crystalline substance obtained from the bark of the tree *Cinnamomum camphora* Nees. (*Lauraceae*).

62. *Smilax china* L.

63. Bahman (Persian)—There existed two kinds of Bahman: red, identified as *Statice limonium* L. syn. *Limonium vulgare* Mill. (*Plumbaginaceae*), and white, *Centaurea begen* L. (*Asteraceae*).

compiling maps of recreated vegetation and in searching for rare and extinct species, included in the *Red Book.*

Amirdovlat Amasiatsi: Philologist and Lexicographer

Amirdovlat Amasiatsi was not only an exceptional physician and natural historian but also a distinguished philologist and lexicographer. He possessed broad knowledge in linguistics and utilized in his works special terminology from many languages. In the foreword to *Useless for Ignoramuses* he wrote: "We learned many words and names [of medicines] and their substitutes in five languages" [43:3]. However, in the list of abbreviations that he provided, there are eight, and not five, languages listed: Armenian, Arabic, Persian, Turkish, Greek, Syriac, Latin, and Frankish (i.e., Old French). Despite the fact that the term Byzantine or Middle Greek is used here for the Greek language, Amirdovlat often provides names of plants in ancient Greek, which he calls "the language of Hellenes." Apart from that, in *Useless for Ignoramuses* in several cases he mentioned names of medicinal plants in Indian, Berber, Kipchak, as well as in several Persian dialects of Shiraz, Khorasan, Kerman, Bukhara, Samarkand, and Balkh.

The Middle Armenian language, in which *Useless for Ignoramuses* was written, was the living spoken language of Amirdovlat's time. Whereas in the language of Mkhitar's works, especially in its system of verbs, there are still present strong elements of Grabar [100], the phonetics, morphology and syntax of Amirdovlat's language completely reflect changes brought about by Middle Armenian language, formed from the whole host of Armenian, and especially Cilician dialects [101:4]. For Cilician dialect, the phonetic shift of consonants is characteristic, as a result of which voiced consonants become pronounced as voiceless, and voiceless consonants are voiced, while keeping their traditional spelling [101:31]. Along with that, there also appeared words that were included in the Armenian language after the consonant shift (primarily borrowed words, especially of Arabic origin) in which the consonant shift had occurred. Apart from that, phenomena of omissions, augmentations and alternations of vowels and consonants, as well as simplification of diphthongs according to

phonetic rules of Middle Armenian language, are common to the phonetics of Amirdovlat's works. All these phenomena could be easily traced, taking as an example special terminology of the book *Useless for Ignoramuses.* The latter consists of Armenian words and borrowings from Arabic, Persian, Turkish, Greek, Syriac, Latin, etc.

Special Armenian terminology of Amirdovlat's pharmacognosy comprises more than eight hundred terms, the majority of which are root words of the Armenian language, which belongs to the eastern branch of Indo-European languages [102:1:29]. The majority of them migrated to the Middle Armenian language from Classical Armenian (Grabar), either unchanged or altered according to phonetic rules. Thus, names of many plants, animals and minerals in *Useless for Ignoramuses* kept the strict classical forms of Grabar, for example *aghtor* for 'Sumach,' *boghk* 'Horse Radish,' *garnalezu* 'Plantain,' *eghevin* 'Artemisia,' *gort* 'frog,' *meghu* 'honeybee,' *meghr* 'honey,' *agh* 'salt,' and many others. Along with these, there are also present typical Middle Armenian forms that appeared from Grabar under the influence of dialects, as a result of omissions, augmentations and alternations of vowels and consonants. For example diphthongs "iu" and "ea" of Grabar, underwent simplification in accordance with the rules of Middle Armenian language, and gave vowels *i* and *e*, for example *arun* 'blood,' *sarek* 'starling.' In addition to that, among terms of *Useless for Ignoramuses* there also appeared new Middle Armenian words that were not present in the ancient stratum, for example *khechipar* 'crayfish,' which has a corresponding term in Grabar *khetsgetin*; *tsapkotruk* 'Anemone'[1] with its parallel classical form *putukkotruk*, and also *tre* (a certain kind of *halva*[2]), and some others.

Among Armenian botanical terms from *Useless for Ignoramuses,* there is a certain group comprising names of some herbs and trees which are derived from names of real historical figures and legendary heroes that migrated to medieval botanical terminology from folklore [103:276–282]. For example, Mandrake, which according to folk beliefs, was capable of bringing its owners happiness and power over people, was named "the tree of the King Alexander." Folk fantasies ascribed miraculous properties to this plant, for, as Amirdovlat described this

1. *Anemone coronaria* L.

2. A paste made of nuts, sugar and oil.

belief, one who has Mandrake root with him "will not drown in water, [will not] burn in fire, and will not be slain by lightning." Mandrake was also named "the tree of Solomon the Most Wise." According to a legend told in a book, a biblical king wore it inset into a ring which gave him power over all beasts. Similar properties were attributed to a flower named *hamaspyur*, about which it is said in a tale: "Bring it to your ear, and unearthly speech will be understood by you, you will be able to understand all languages of peoples, discern voices of beasts and birds" [104:99]. Honey unction[3] was named in Armenian terminology after the prophet David. The preacher of Christianity in Armenia—Grigor Lusavorich (The Illuminator) is mentioned in *Useless for Ignoramuses* in conjunction with the name of Germander.[4] The latter was also called *maremkhot* 'the grass of Mary.' The name of another Grigor, the greatest Armenian poet of tenth century Grigor Narekatsi, is linked to the origins of Juniper[5] [104:103]. The majority of these plants also had other names, for example Mandrake—*marmnatak*, Germander—*khnkoghkuzak*, etc.

Apart from Armenian root words, Amirdovlat's medico-botanical terminology also included borrowed terms that entered the Armenian language at different times. Some of them (mostly Parthian, Greek and Syriac words) took a strong hold in Armenian vocabulary and became so familiar that they ceased to be viewed as foreign. Parthian terms that enriched Grabar's vocabulary represent the largest part of them. Names of certain plants, birds and animals in Grabar, and later in Middle Armenian language, were represented by borrowed Parthian words: *spand* 'Syrian Rue,' *khunk*, *kndruk* 'Cistus,' *serkevil* 'Quince,' *sokh* 'Onion,' *baza* 'falcon,' *apukht* 'jerky,' *karag* 'butter,' etc.

Among these borrowings, the second place belongs to the words of Greek origin. In ancient times, and especially during the period of activity of Hellenophile school, the Greek language was one of major sources that enriched Armenian scientific terminology. Of these words, in *Useless for Ignoramuses* there are *margarit* 'pearls,' *porpyur* 'Porphyra,'[6] *balasan* 'balsam,' *kiparis* 'Cypress,'[7] *sandal* 'Sandalwood,'

3. Oily exudate of certain trees.

4. *Teucrium polium* L. (*Lamiaceae*).

5. *Juniperus communis* L.

6. *Porphyra* (Greek)—certain kind of marble.

tarikh 'smoked herring,' *kokordilos* 'crocodile,' etc. During this early period, there were many words included in Armenian scientific terminology from the Syrian language: *terevat* 'Spurge Olive,'[8] *khlurd* 'mole,'[9] *kughb* 'beaver,' etc.

The fact that in these words there was no written evidence of the consonant phonetic shift that took place in the Middle Armenian language, serves as a testimony to their considerable antiquity [101:31]. For example the Parthian words *apukht*, *baza*, *khunk*, *kundruk*, *spand*, were transcribed into the Classical Armenian language without alterations in correspondence among the systems of voiceless and voiced consonants in these languages. The same can be said about the Greek words *crocodilos*, *balsamon*, *tarichos*, which were transcribed in the Classical Armenian language, keeping the correspondence among the systems of voiceless and voiced consonants, and only losing Greek endings.

Starting with the tenth century, in Armenian scientific terminology, there were a considerable amount of Arabic and Persian terms that significantly suppressed Greek ones. Moreover, during this era, many Greek terms are borrowed indirectly, but through their Arabic forms. All this is evidence of the ever-increasing influence of the Arabic language as the language of scientific terminology in the East. Careful study of these terms showed that here the phonetic shift found its graphic expression, i.e., voiced consonants of the Arabic and Persian languages: *ba* [b], *dal* [d], *jim* [j], *gaf* [g], are transcribed as voiceless consonants in Armenian: *pe* [p], *tyun* [t], *che* [ch], *ken* [k], and voiceless consonants *pe* [p], *ta* [t], *kaf* [k]—as aspirate consonants *p'* [p'], *t'* [t'], *k'* [k']. K. Basmajian pointed out certain peculiarities of this phonetic system, which tried to convey not only the graphic appearance of foreign words, but also their pronunciation, despite great phonetic incongruities among these languages [43:xi-xii]. Apart from that, Amirdovlat Amasiatsi in several cases also used pure transliteration, i.e. reproduction of graphic appearance of foreign words without taking into consideration specifics of their pronunciation. So, the Arabic name of Oleander—*difla*, in *Useless for Ignoramuses* was transliterated as

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7. *Cupressus sp.*

8. *Daphne mezereum* L.

9. *Talpa sp.*

difla, but, according to the rules of phonemic transcription also exists in the form *tifla*.

Arabic and Persian terms that comprise the vast majority of foreign adoptions underwent marked distortions in Arabic and Persian *mufradats*, which served as sources for *Useless for Ignoramuses*. Translators of eastern pharmacognosies noted this fact as well. U. Karimov wrote: "The major difficulty that we encountered during our work in translating the *Saidana*, was a critical reconstruction of a large amount of distorted terms: Greek, Syriac, Indian, and, partially, Iranian and Arabic. We can say that in the *Saidana* there are almost no paragraphs without a distorted word, and in some paragraphs almost all foreign terms are distorted. Some of them are distorted beyond recognition, and because of that, some parts of the text seem like piles of senseless words" [69:4:117]. In such cases, the researcher's work becomes more like solving puzzles and deciphering cryptograms.

Term distortions that took place in eastern pharmacognosies depend on specifics of Arabic graphics, and in the majority of cases occur because of either wrong placement of diacritic dots, or confusion with the way that similarly appearing graphemes are written [105]. In analyzing adopted Arabic and Persian terms of *Useless for Ignoramuses,* we found that in the majority of cases distortions could not be blamed on Armenian scribes (however, in some instances, distortions due to scribes also took place) but on those much earlier sources, which were used by Amirdovlat. For example, the Arabic term *abu-kabis,*[10] was turned into *abu-fayes*, and then transcribed by Amirdovlat as *apu ghanis*. The possibility of distortions of these terms because of errors of Armenian scribes is out of the question, for letters *pe* and *nu* of Armenian alphabet, as well as *fe* and *ghat* are so markedly different, that could not be confused one for another.

One could provide a multitude of similar examples. In some cases distortions that existed in Arabic source continued peacefully to coexist with their correct forms. They ceased to be viewed as identical, and were further separated into paragraphs of their own. For example, Persea[11] was described in *Useless for Ignoramuses* in two paragraphs under the names *lanach* and *lanch*, which are distortions of the Arabic

10. *Euphorbia spinosa* L.

11. *Mimusops schimperi* Hocht. (*Sapotaceae*).

term *labah*. Contents of these paragraphs are not identical, but at the same time it can be seen that they both talk about the same medicine. So, in paragraph 952, the medicinal properties of Persea are characterized in the following manner: "Its fruit helps against stomach pain. If its leaves are dried, pulverized and sprinkled onto a bleeding spot, then [it will] help and stop the bleeding. And if fruits are eaten, then it will constipate the belly and strengthen the stomach [as] well" [43:186]. In paragraph 1004 is said about the same plant: "It stops bleeding [if taken] as a drink as well as if anointed. It belongs to the group of medicines that stops diarrhea" [43:195].

Generally, paragraphs in which distorted names of medicines are described, are often close by those where their correct forms are located. Apart from that, in some cases there are repetitions when in different paragraphs the same medicine is described in exactly the same words or with insignificant variations. Such repetitions are quite common in eastern pharmacognosies, which was pointed out by U. Karimov [69:4:113].

Along with unsubstantiated separations of phonetic variations of the same term into independent paragraphs, in *Useless for Ignoramuses* there is also an opposite tendency: inclusion into the same paragraph names of absolutely different medicinal compounds, based upon their similarity. In some cases it could happen because of the scribe's errors, when the scribe mechanically consolidated the whole array of small paragraphs, which followed one another. For example, in paragraph 1000, the Arabic name of Caper Bush,[12] *lasaf*, is unexpectedly identified with the name for sulfur. The cause of the error is, in our opinion, the similarity of the arabized form of the Greek name of Caper bush *kabar* with Arabic name for sulfur *kibrit*. Apparently these were two different paragraphs which were later consolidated into one.

During the Middle Ages, Persian terms continued to be used in Armenian scientific terminology. Along with direct borrowings from Persian pharmacognosies, there was a certain amount of terms borrowed indirectly, as Arabic derivations from Persian terms. There was also an opposite phenomenon: Arabic terms were presented as their Persian derivatives, which indicates that they were borrowed from a Persian source. So, Middle Armenian forms of Arabic terms *asal-i*

12. *Capparis spinosa* L.

Tavut 'honey unction,' *zarur-i chapali* 'Hawthorn',[13] *as-i parri* 'Butcher's Broom',[14] etc. reveal the presence of the *isafet* construction—connective particle *i* or *yi*, which is natural in Persian and is a testament for the adoption of these Arabic words from Persian pharmacognosies. The author of the book *Useless for Ignoramuses,* who was intimately familiar with the flora, fauna and mineral resources of Iran, and traveled a lot in that region, often presents not only literary, but also local dialect names of medicines, and especially those used in Shiraz, Khorasan and Isphahan. Among the synonyms for Common Toadflax[15] Amirdovlat mentions several Persian names: *pulpul-i shami* (from *bolbol-i shami*), that literally means 'Syrian nightingale,' *kishnich-i kohi* (from *kishniz-i kuhi*, literally 'Mountain Coriander'), *triak kokhi* (from *tiryak-i kuhi* literally 'Mountain Teryak,' a Shiraz dialect synonym—*kazarank* (from *kazrak*). Persian plant names, borrowed in medieval times, served, just like the majority of the Arabic terms of that period, as a foundation for creating the whole array of the Armenian terms by means of the loan-translation[16] principle, but, unlike early Parthian borrowings, they did not take root in Armenian medical and botanical terminology.

Greek terms that were included in Armenian botanical terminology after the consonant shift, were, as a rule, borrowed from Arabic pharmacognosies. Despite the fact that among them there are some words undistorted by Arabic graphics: *filitis* 'Phyllitis—millipede,' *asaron* 'Asaron—Hazelwort,'[17] as well as some others, but the majority underwent Arabization. So, the Greek name for Yellow Loosestrife[18] (Lysimachion) was without a doubt borrowed from the Arabic source, in which this name underwent distortion because of incorrect placement of diacritic dot, thus turning from *lusimakhiyas* into *lusimajiyas*, and was transcribed by Amirdovlat as *lusimachius*. Such distortions were sometimes so drastic that the 'new' word, formed in

13. *Crataegus azarolus* L.

14. *Ruscus aculeatus* L. (*Liliaceae*).

15. *Linaria vulgaris* Mill.

16. Loan-translation = calque.

17. *Asarum europaeum* L. (*Aristolochiaceae*).

18. *Lysimachia vulgaris* L. (*Primulaceae*).

such manner, quite often lost any connection with its source and began to express a completely new notion, separated into its own paragraph. For example Dioscoride's Greek term *adarkes*, which was used in ancient pharmacognosy for a certain variety of 'sea foam,' was Arabized and turned into *azarkus*, or *azarkis*. The latter, in al-Biruni's *Saidana* served as a name for Prickly Saltwort[19] [69:4:206]. In Amirdovlat's pharmacognosy it was transcribed as *azarigi*, and, as opposed to the related term *azaragion*, which still meant 'sea foam,' began to be taken for the name of one of the Dogbane species.[20] Perhaps, the confusion was again caused by the similarity between Greek names of this Dogbane species and a 'sea foam'—*apocynon* and *alcyonion*.

Botanical terms, borrowed in Middle Ages from the Syriac language, underwent a consonant shift in Middle Armenian, whereas terms, borrowed in ancient times, did not. The same phonetic rules are applicable to terms borrowed from the Turkish language.

In the foreword to *Useless for Ignoramuses*, Amirdovlat Amasiatsi points out that he used literature in the Frankish language, i.e. that he used European pharmacognosies. As 'Frankish' he lists such words as *farfium* 'Milkweed,'[21] *papunisa* 'Chamomile,' *palsami* 'balsam,' *sikinandu* 'Lemongrass,'[22] *layuri* 'Bay Laurel,'[23] and some others.

The majority of these terms are Greek, Latin, and sometimes Arabic or Persian plant names that oftentimes underwent drastic distortions and were transcribed in accordance to phonetic laws into Middle Armenian. It is impossible to tell whether they were taken by Amirdovlat from Frankish, i.e., European pharmacognosies, or indirectly borrowed from eastern ones. The first hypothesis is, in our opinion, probable, for during the Amirdovlat's era, pharmacognosies began to appear even among the Franks [106], and they could have been known in medical circles in Constantinople, where contacts with European countries always existed. In the depositories of the Saltykov-

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19. *Salsola kali* L. (*Chenopodiaceae*).

20. *Apocynum erectum* Vell.

21. *Euphorbia sp.*

22. *Andropogon schoenanthus* L. (*Poaceae*).

23. *Laurus nobilis* L. (*Lauraceae*).

Schedrin's State Public Library in Sankt-Peterburg we were able to find two little-known medieval French manuscripts of fifteenth-sixteenth centuries—marvelously illustrated dictionaries of simple medicines, created under the influence of *Constantinople's Dioscurides*. The fact that among the Frankish terms in Amirdovlat's book there are also found terms of Arabico-Persian origin (for example *papunisa*), could serve as an indirect proof of the hypothesis of the eastern *mufradat's* role in the genesis of European pharmacognosies. The Persian term *babuna* 'Chamomile' underwent quite a peculiar evolution: in European pharmacognosies it took the ending *-is* of the Latin genitive case, and then was borrowed into medieval Armenian terminology in the form of the oblique case, becoming *papunisa* or *papunis*.

Our analysis of the so-called Frankish terms of Amirdovlat's pharmacognosy demonstrated that their main source was the trilingual Armenian-Arabic-Latin dictionary, *The Names of Medicines*, from Physician *Hovhannes's Book of Remedies* [107, folio 10a]. The majority of these terms indeed represents Latin, Latinized Greek, and Frankish names of medicinal compounds taken from the dictionary that was created several decades earlier by one of Amirdovlat's predecessors. So, such terms in *Useless for Ignoramuses* as *gamilum veneris* '*Capillus veneris*,' *ligurisiay* '*Liquiritia*,' *kalpanum* '*Galbanum*,' *sempervivu* '*Sempervivum*,' *farfium* '*Euphorbeum*' correspond to the following analogous or slightly modified terms from the dictionary, *The Names of Medicines*: *gabillum veneris*, *ligoyrisia*, *kalpanum*, *sember viva*, *eoyfavrpium*.

Karst, who in his times thoroughly studied the dictionary, *The Names of Medicines*, noticed a rather liberal transcription of Latin and Frankish terms in the Middle Armenian language, while at the same time Arabic and Persian terms were transcribed in accordance to the strict rules [108]. This fact he attributed to the poor knowledge of the language on the part of the dictionary's creator, which was demonstrated in arbitrary changes of the endings in Latin words from *-us* to *-um* and vice versa, in using the genitive case instead of nominative one, etc. The above-mentioned errors in transcription of Latin terms in the dictionary, *The Names of Medicines* were not corrected in Amirdovlat's pharmacognosy, who did not approach his sources with enough criticism.

Lastly, we might say a few words about Indian terms in the book

Useless for Ignoramuses. Their number is not great: *kachur* 'Wild Ginger,'[24] *fufal* 'the kernel of Areca Palm,'[25] *narchil* 'Coconut,' *narpasi* 'Zedoary,'[26] *pes* 'Aconite'[27] as well as names of some other plants of Indian flora. The Indian name for Zedoary, according to Amirdovlat, is linked with the name for Aconite, against which it served as an antidote. As far as the latter is concerned, the author of *Useless for Ignoramuses* writes that "it can be found in the form *pes*, and not *pesh*, like in Arabic, for in the Indian language there is no *sha* letter" [43:320]. In reality, the name for Aconite in Indian languages, *Bish,* originated from the Sanskrit *visha* 'poison.' Apart from that, in Sanskrit, as well as in the modern Indian languages, there is a consonant *sh*. Amirdovlat, however, did not make a mistake, for his statement is correct for some of Middle Indian languages. Al-Biruni, in his *India* wrote: "It is mentioned that the number of their letters was fewer, and later it grew. This is quite possible" [69:2:175]. And it is truly so, for in Punjabi language, the consonant *sh* is a borrowed one. In Punjabi, as well as in some other Indian languages, there are phonetic variations, in which *s* is used instead of *sh*, for example in Punjabi, the name of one of the species of Asparagus[28] is *Satavar*, whereas in Malayalam it is *Shat-avali*; Parsley in Hindi is named *Sowa*, whereas in Bengali—*Shonva* [109:60, 324].

Therefore, the above-mentioned statement by Amirdovlat was reasonable, which once again, is an evidence to vast linguistic knowledge of the medieval Armenian physician. His lexicographic experience, which was reflected in *The Tabular Dictionary* and in *The Dictionary of Substitutes*, was especially well demonstrated in his encyclopedia, *Useless for Ignoramuses,* which is indeed, one of the most magnificent phenomena of medieval Armenian lexicography [83:2:27–34].

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24. *Zingiber zerumbet* Rose. (*Zingiberaceae*).

25. *Areca catechu* L. (*Arecaceae*).

26. *Circuma zedoaria* Rosc. (*Zingiberaceae*).

27. *Aconitum ferox* Wall.

28. *Asparagus racemosus* Roxb.

Amirdovlat Amasiatsi: Physician and Pharmacognosist

Serious research on pharmaceuticals from the ancient Armenian pharmacognostic arsenal did not begin until the second quarter of the twentieth century, when K. Basmajian published Amirdovlat' s book, *Useless for Ignoramuses.* H. H. Sepetchian, an authority on Armenian folk medicine, was one of the early enthusiastic researchers [110–112]. In the 1940s and 1950s, a group of Armenian pharmacologists under the supervision of S. A. Mirzoyan, had experimentally evaluated several medicaments of plant origin, recommended by Amirdovlat for the treatment of the diseases of the respiratory and circulatory system and diseases of digestive tract, as well as some other ailments.

The search for Armenian medicinal folk heritage has continued ever since [116–118]. Terminological difficulties created certain obstacles for precise identification of ancient names of medicaments in the book, *Useless for Ignoramuses.* In addition to that, in the five centuries that had passed since this book was written, names of many pharmaceuticals were significantly altered and misspelled by numerous copyists. For critical reconstruction of altered terms, autographs of the book from the Mashtots Matenadaran and foreign collections were used. Apart from that, to decipher borrowed terminology, sources cited by Amirdovlat, especially the *Materia Medica* by Dioscorides [3], the *Canon* by Ibn Sina [11], *Saidana* by al-Biruni, the *Grand Collection on Properties of Simple Medicinal and Food Stuffs* by Ibn al-Baytar [119], *The Consolation for Fevers* by Mkhitar Heratsi [22], sources on phytotherapy, botany and pharmacology, various dictionaries of medieval Armenian names of plants, animals and minerals, as well as thesauruses of various foreign terms [120–138], were called upon.

After precise contemporary names for diseases and pharmaceuticals were established, the information obtained from the book was reviewed. Comparison of data of medieval Armenian pharmacognosy on plants described in the book, *Useless for Ignoramuses* with results of contemporary chemical, pharmacological and clinical analyses of the

same plants, shed light on mechanisms of their action and principles of medieval phytotherapy [139–147].

Treatment of infectious diseases and allergies

The treatment of infectious diseases and allergies was one of the major subjects in medieval Armenian medicine from the time of Mkhitar Heratsi. In medieval medical books these ailments were viewed as various kinds of fevers. Infectious diseases were called 'wasting' and 'mold' fevers, whereas various allergies (physical, chemical, food, neuro-psychological) were all called 'one-day' fevers. Special attention was given to the nettle rash (called *shara* in Arabic) and asthma (*rabu*). It is worth mentioning that various forms of tuberculosis were included in the 'wasting' fevers category, whereas all other infectious diseases known to medieval medicine, such as malaria, typhus, scarlet fever, cholera, measles, plague and septic diseases, were considered to be 'mold' fevers. Due to the fact that the same plants were often used for treating 'one-day' fevers as well as 'wasting' and 'mold' fevers, we present them in the same paragraph, despite the fact that contemporary medicine treats them as separate nosologic entities.

Amirdovlat recommends a wide variety of herbal medicines for treating infectious and allergic fevers. The majority of these medicines were obtained from Armenian and Eastern medicinal herbs. In medieval Armenian botany, when describing local species, plant names ascribed by Dioscorides for Greek, Italian and European flora, were often used.

The majority of medicinal herbs that Amirdovlat used against infectious diseases and allergies belong to the following families: *Apiaceae, Araceae, Asteraceae, Lamiaceae, Oleaceae.* Let's take a closer look at some of them. Here is the description for Cow Parsnip[1] from the book *Useless for Ignoramuses*: "This plant has leaves similar to Sycamore[2] and Opopanax.[3] It reaches one *elbow*[4] in height. Its root is

1. *Heracleum sphondylium* L.

2. *Platanus sp.*

3. *Opopanax chironium* Koch. (*Apiaceae*).

white and looks like radish. It grows in wet places. If eaten, its seeds dissolve mucus and bring relief from ailments of gall bladder and liver, as well as icterus, asphyxia and epilepsy. An infusion made from its root helps cure ailments of gall bladder and liver as well as asthma" [43:535]. As we may see, the plant was effective in treating asthma as well as liver infections. Amirdovlat uses a term *sughuntulion* (distorted Arabic derivative from Dioscorides' *sphondylion*), which corresponds to a name for European species *Heracleum sphondylium* L. According to the contemporary data, Armenian species—*H. sosnovskyi* Manden. is rich in volatile oils and the furocumarin derivatives (pimpinelline and isopimpinelline) [138:2:175].

The root of Sweet Flag,[5] a plant that is sparse in Armenian flora, was considered effective against nettle rash. Amirdovlat wrote about its medicinal properties: "It is quite helpful for the ailment named *shara*. On the first day give one and a half *dram*[6] of the root in honey-vinegar, on the second—half a *mtkhal*,[7] on the third—one *dram*. The ailment will completely disappear" [43:36]. Acorus root is rich in volatile oils, including eugenol, asarone, sesquiterpenes, as well as the alkaloid calamine, the bitter glycoside acorine and various resins. In contemporary medicine its antiallergic properties are not studied. It is used for promoting appetite, aiding digestion and for treating an acidic gastritis.

Wormwood[8] was used in the past for treating allergies. This plant was also considered effective against asthma and helminthosis, while possessing a lot of other medicinal properties. "The best kind is a yellow [Wormwood], brought from Armenia. It helps to cure asthma and short breath. It is also diuretic, promotes menstrual bleeding, aborts pregnancy and expels flatworms. It helps to cure spleen [hardening]. The Armenian kind of Wormwood also helps to cure any poisoning, even scorpion and tarantula bites" [43:96]. Apart from the

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4. Medieval unit for measuring length. 1 *elbow* equals to approximately 50–62 cm.

5. *Acorus calamus* L.

6. Medieval unit for measuring weight. 1 *dram* equals 2.942 grams.

7. Medieval unit for measuring weight. 1 *mtkhal* equals 4.414 grams.

8. *Artemisia sp.*

poisonous lactone santonin ($C_{15}H_{18}O_3$), Sea Wormwood[9] as well as other species of Wormwood, contain volatile oils with strong antiinflammatory and antiallergic properties, due to the presence of the sesquiterpenoid alcohol sesquiartemisol ($C_{15}H_{24}O$) [138:2: 311]. According to Amirdovlat, another Asteraceous plant from Armenia—Elecampane,[10] possesses properties similar to Wormwood. The juice of its root, mixed with honey, was prescribed for treating asthma and asthmatic bronchitis. These properties are due to the presence of sesquiterpenoid lactones in the plant's volatile oils.

The medicinal properties of the Armenian species—Galingale[11] and Nut Grass,[12] are caused by the presence of volatile oils. Amirdovlat said: "The root of this plant is aromatic. It expels large and small worms from the stomach. It also helps to cure plague. It also helps if a person, sick with nettle rash lies on its leaves" [43:509].

In medieval Armenian medicine many plants from the *Lamiaceae* family, rich with volatile oils, were used as antiinflammatory and antiallergic agents. Amirdovlat wrote the following about Horehound[13]: "This is a herbaceous plant whose stem is nodulous and tetrahedral in cross-section. Leaves are tough and heavy, blunt and round, with rough surface. It grows by the roads: [it] may be seen first in spring, and second—in autumn. It has bitter taste, the leaves have a whitish hue. They are rough like Lemon Balm leaves. It promotes menstrual bleeding and aborts pregnancies. It is also one of the medicines [active] against many poisons. If its root is ground and sifted, and then mixed with honey to the consistency of thin gruel, it helps to fight coughing. It helps to cure asthma and short breath. If a gargle is prepared by boiling six *drams* of its leaves, and then given to a person suffering from a strong cough, the cough will disappear. And do it for six days! It is very good for the chest" [43:611-612]. Horehound contains a volatile oil, the diterpenoid lactone marrubin ($C_{21}H_{28}O_4$), alkaloids and tannins—all kind of compounds effective against various respiratory tract diseases,

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9. *Artemisia cina* Berg.

10. *Inula helenium* L. (*Asteraceae*).

11. *Cyperus longus* L.

12. *Cyperus rotundus* L.

13. *Marrubium vulgare* L.

especially asthmatic bronchitis [138:2:229]. The Armenian species of Hyssop[14] is used to cure those ailments. It is also mentioned in some books as possessing antileprous activity. Mkhitar Heratsi recommended this herb for treating tuberculosis [22:120].

In Eastern medicine, Olive oil was often used to fight allergies. Ibn Sina wrote: "The oil of wild Olives is used to cure erysipelas, herpes and nettle rash. . . The smoke from [burning] black unpitted olives is used for asthma and lung diseases" [11:2:249-259]. There is similar information in *Useless for Ignoramuses.* Olive trees were cultivated in medieval Armenia. Their fruit contains up to 70% oil rich in vitamins (D,E,B_1, carotene). A glycoside oleyropein that possesses antihypertensive properties has been isolated from Olives. Flavonoids and volatile oil have been found in Olive tree leaves.

A Mediterranean species that is also found in Armenia—Wild Jasmine,[15] was often used to treat similar diseases. Amirdovlat wrote: "Boil six *drams* of its root in 120 drams of water till half of the water evaporates, squeeze out the extract, dissolve in it equal amount of sugar. The extract is helpful in cases of chronic cough and shortness of breath. It also helps to treat asthma" [43:154]. This plant also possesses protistocidal and antibacterial properties. Its bark and leaves are rich in tannins; glycosides are found in its bark, tokoferol and carotene in its leaves, and volatile oil in its flowers. Wild Jasmine is also of interest to contemporary medicine because of its antiallergic properties.

The juice of Plantain[16] was widely used for treating infectious and allergic fevers in the past. Amirdovlat wrote: "Its juice helps against kidney and urinary bladder ulcers, and eliminates blood in urine. It opens clogged liver and spleen, and stops the formation of sperm. [It helps] to treat all kinds of hot inflammations, nettle rash, goose bumps, burns, furunculosis, elephant disease[17] and malignant ulcers. This juice is helpful against alternating fever" [43:110]. According to contemporary data, Plantain juice contains the glycoside aukubin, mucilage, tannins, resins, organic acids, saponins, sterins, enzymes and vitamins (C, K, carotene) [151:191].

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14. *Hyssopus angustifolius* M.B.

15. *Jasminum fruticans* L. (*Oleaceae*).

16. *Plantago sp.*

17. Elephantiasis.

Plantain also possesses bactericidal and hormonal activity, which explains its effectiveness against the above ailments, especially allergies. Plantain leaves and seeds are favorite remedies of folk medicine. Physicians recommend Plantain for treating stomach and duodenal ulcers, and as an expectorant [149:987].

Hormonal action is also attributed to some other medicinal herbs in Amirdovlat's pharmacognosy, in particular, Gromwell[18]: "Take two drams of its seeds with white wine to cause menstrual bleeding, dissolve stone, cause copious urination, and help in case of asthma" [43:307]. This plant is a part of the Armenian flora. It is used in folk medicine of many countries. In Chinese medicine it is used to treat nettle rash and other skin disorders. Gromwell root, as well as roots of other members of its family, is rich in the red pigment alkannine, whereas its leaves contain estrogens, and its seeds—unsaturated fatty acids, that possess antitireotropic properties [138:2:2-187].

Analysis of herbs used in Armenian folk phytotherapy shows that the majority of medicinal species contain volatile oils. These oils contain terpenoid hydrocarbons and their oxygen-containing derivatives (pinene, kamphene, fellandrene, sesquiterpenes, thymol and borneol). Sesquiterpenoid lactones are of a particular interest for evaluating new pharmaceuticals in contemporary medicine. Many of Amirdovlat's herbs with antiallergic properties, apart from sesquiterpenoids, contain sesquiartemisol (e.g., Sweet Flag, Wormwood,[19] Elecampane). This group also includes plants with hormonal properties (Horehound, Black Cumin,[20] Plantain) as well as plants with broad spectrum antiinflammatory and antiallergic activities.

Treatment of kidney and urinary bladder diseases

Many of the species that belong to the above-mentioned families were used in medieval Armenian medicine not only for treating infectious and allergic fevers, but also for a whole array of ailments, in aethiopathogenesis of which infectious and allergic element plays a

18. *Lithospermum officinale* L.

19. *Artemisia cina* Berg.

20. *Nigella sativa* L.

major role. So Gromwell, Black Cumin, as well as some species of *Thymus*, *Juniperus* and *Artemisia* were recommended as antiinflammatory, diuretic and litholytic medicines for urinary bladder and kidney ailments. In *Useless for Ignoramuses* there is mentioned a large number of such medicinal plants.

Ibn Sina, who spent a lot of effort searching for an effective litholytic medicine, wrote: "Here are the goals that physicians are trying to achieve while treating for kidney stones: cessation of [kidney stone] matter formation, prevention of kidney stone development by means of elimination and remediation of the cause, crushing and splitting of the stones thereafter, breaking off and elimination of the stones from the place where they originate by means of remedies that produce these effects, after which they are expelled gently and gradually. Some people attempt to extract stones through a cut on the body's side or the back, but this is a very dangerous deed, undertaken [only] by a person devoid of reason" [11:3:2:293]. These words of Ibn Sina had a profound influence on the treatment methods of medieval physicians. As predicted even before Ibn Sina by Hippocrates, kidney operations would inevitably result in the patient's death, especially considering the level of surgical instrumentation and absence of sterile conditions of the time. That explains why the conservative approach, and especially phytotherapy, was so popular in the treatment of kidney stones. Amirdovlat Amasiatsi, just like many Armenian physicians before him (among them the author of Gagik-Hetum's *Bzhshkaran* and Mkhitar Heratsi), investigated aethiopathogenesis, clinical pathology and treatment of nephrolithiasis, and tended to use the same conservative approach, based on methods of Armenian folk medicine [25, folio 152a; 30].

For the treatment of kidney stones Amirdovlat especially favored the following members of the family *Apiaceae*: Dill,[21] Ajwain,[22] Celery,[23] Fennel,[24] many of which have a long history of cultivation in Armenia and are commonly used as greens and spices. Centuries-long usage of

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21. *Anethum graveolens* L.

22. *Carum copticum* [L.] Benth. et Hook.

23. *Apium sp.*

24. *Foeniculum vulgare* Mill.

these species of plants in Armenian diet was a peculiar empirical preventive medicine for kidney stones. This is what is said about Dill in *Useless for Ignoramuses*: "It can be a garden or a wild variety. The best is the one from the garden that has a yellow flower. It helps belching and colic, dissolves the stone and is helpful for lower back pains" [43:429]. According to contemporary studies, Dill fruits contain up to 4% volatile oil that partially consists of carvone, limonene and phellandrene, whereas the green parts of the plant contain flavonoids, carotene and ascorbic acid. A remedy made of Dill fruits found its use in contemporary medicine as a spasmolytic [149:569]. St. John's Wort[25] possesses a similar action. Its fruits, leaves, seeds and resin was used in medieval phytotherapy. "This plant grows on the island of Crete," wrote Amirdovlat. "Its leaves are small. St. John's Wort has fruits and stems. And its resin is gum-like. If you make a plaster of its fruits, leaves and resin with wine, and apply it to a spot where an arrow got stuck, it (plaster) will pull it out. And if you drink it, it will stop difficult urination, dissolve the bladder stone and expel it. It causes menses. Drink 2 *drams* of it!" [43:564]. St. John's Wort is found among the Armenian flora. It is rich in volatile oils, tannins, flavonoids and vitamins and possesses a strong bactericidal activity [155:108].

The family *Asteraceae* is also rich in volatile oils. In *Useless for Ignoramuses* Amirdovlat recommended Southernwood,[26] Mugwort,[27] and two species of Tansy,[28] for treating kidney stones. About the last species he writes: "This is an herbaceous plant, the flower of which is similar to flower of Camomile,[29] and leaves [are similar] to a Carrot's leaves. Its color is dark green, it tastes and smells like Wormwood.[30] It appears in summer days. It dissolves kidney stones. If three *drams* [of its juice] are imbibed, that [will cause] copious urination, dissolve and expel the bladder stone" [43:108–109]. Volatile oils of this plant contain

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25. *Hypericum perforatum* L., (*Hypericaceae*).

26. *Artemisia abrotanum* L.

27. *Artemisia vulgaris* L.

28. *Tanacetum argyrophyllum* (C. Koch) Tzvel. and *T. parthenifolium* Sch. Bip. (Will).

29. *Matricaria sp.*

30. *Artemisia sp.*

the sesquiterpenoid lactones vulgarine, tamirine, etc. [156]. *Tanacetum argyrophyllum* is a common species in Armenia and is used in Armenian folk medicine for nephritis. As far as Mugwort is concerned, its leaves and roots are recommended for epilepsy, gynecological ailments and fevers. This plant is a common weed in many parts of Armenia.

Some other species of Wormwood also possess litholytic properties. N. H. Maksudov was able to isolate a novel drug, called '*Artemizol*,' from *Artemisia scoparia* W. et K. *Artemizol* is very effective for treating nephrolithiasis. Its main active ingredients are α- and β- pinenes and mercen [157:136].

Water Plantain[31] was also used in the phytotherapy of nephrolithiasis, and Amirdovlat wrote the following in *Useless for Ignoramuses*: "Its leaves are like Plantain's.[32] It reaches about 1 [*palm*[33]] in length, but could be even higher. Its apex is much like [column's] capital. The flower is white with yellowish hue. [Its] root is like the root of Black Hellebore,[34] but smells pleasantly. . . If a hot water infusion is made and then drunk, then kidney stones dissolve" [43:363]. According to contemporary data, Water Plantain rhizome contains volatile oils, tannins, resins and free acids. The presence of the latter explains, for the most part, the litholytic properties of Water Plantain. It is known that citric and some other acids aid in dissolving phosphates and carbonates. This plant is common in many parts of Armenia and was historically used in folk medicine as a diuretic.

According to Amirdovlat, certain plants from the Cabbage family (*Brassicaceae*) also possess litholytic properties: Wild Radish,[35] Garden Radish,[36] and Wild Mustard.[37] He said about Garden Radish: "Pound Garden Radish without leaves, take 10 *drams* of its juice and drink it on an empty stomach. Doing that will dissolve small and large stones, and

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31. *Alisma plantago-aquatica* L.

32. *Plantago major* L.

33. Ancient unit for measuring length; 1 *palm* equals about 22.5 cm.

34. *Helleborus niger* L.

35. *Raphanus raphanistrum* L.

36. *Raphanus sativus* L.

37. *Sinapis arvensis* L.

expel them from the urinary bladder. This is well proven" [43:108]. In *Useless for Ignoramuses* he also describes some hormonal properties of Garden Radish, and lactagogic and aphrodisiac properties in particular. Medicinal activity of the plant is thought to be caused by the presence of the steroid saponins. An antibacterial compound was also isolated from Garden Radish seeds [138:2:70]. Apart from Garden Radish, Wild Radish also grows in Armenian mountains. A glycoside similar to sinalbine of Mustard was isolated from its seeds.

Some other plant species that were used in medieval medicine for kidney stone disease also possess hormonal activity. One of them is Caltrops.[38] "Armenians call it *tatash*, wrote Amirdovlat. These plants can be wild and domesticated. The best kind grows in sandy spots and is of green color. . . It dissolves kidney stones and cures difficult urination. It also helps to cure colic and lower back pains. It improves sexual potency as well if imbibed or used as an enema. Its oil is also quite helpful in strengthening sexual potency" [43:248]. Caltrops grows as a weed in many regions of Armenia. The plant is still used in folk medicine. It contains steroid saponins [138:2:124].

The presence of empirically found hormonal properties in many litholytic plants is hardly accidental. At the present time it is a well-known fact that apart from infection, estrogens, 17-corticosteroids and thyroid hormones play an important role in aethiopathogenesis of nephrolithiasis.

For dissolving kidney and urinary bladder stones Amirdovlat recommended a whole array of plants that contain dyeing agents (alcanine, alizarine) in their roots. An ancient litholytic medicine, made of Madder[39] root according to *Useless for Ignoramuses,* "causes copious urination and miscarriage. . . opens clogged liver, dissolves stones and helps to cure icterus" [43:620]. Madder rhizome contains ruberithrinic acid that produces alizarine ($C_{14}H_8O_4$) upon cleavage. Madder is also one of the ingredients of Czech litholytic remedies '*Cistenal.*' One of the plants of Armenian flora, *Rubia iberica* C. Koch., possesses bacteriostatic properties [138:2:272].

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38. *Tribulus terrestris* L.

39. *Rubia sp.*

Gromwell and Anchusa[40] have analogous properties. Apart from dyeing compounds, these plants contain steroid saponins, sterins and other compounds with hormonal activity. As a result of reduction-oxidation reactions that dyeing compounds undergo in the human body, the pH of urine decreases and certain kinds of urinary stones dissolve.

In the phytotherapy of nephrolithiasis, a special kind of colloids: gums and gum resins enjoyed broad use in the past. Gums and gum resins are polysaccharides, calcium, magnesium, and potassium salts of saccharoresinous acids. According to contemporary science, magnesium salts, as well as other urine electrolytes, are very important in processes that have to do with dissolving urinary tract stones. Amirdovlat recommended gum resins of various *Ferula* species: *galban* that is produced by *Ferula gumosa* Boiss., and *sagapenum* that is produced by *Ferula szowitsiana* DC., as well as gums of the Prune tree, Almond tree and Sour Cherry tree.

As we can see, in medieval Armenian phytotherapy there was a wide array of empirically elucidated medicaments for nephrolithiasis. They contain antibacterial and antiallergic compounds, components of essential oils, hormone-like substances, organic acids, tannins, gums and resins—all the compounds that possess great therapeutic value from the point of view of contemporary data on aethiopathogenesis of nephrolithiasis. Given all that, some of these compounds could be successfully used by contemporary medical science.

Treatment of eye ailments

In medieval Armenian medicine a great deal of attention was paid to the treatment of eye ailments. In Gagik's-Hetum's *Bzhshkaran*, in the many works of Mkhitar Heratsi, Grigoris, Stepanos and many other representatives of the Cilician school of medicine, treatment of eye ailments is one of the most important topics. Amirdovlat Amasiatsi specialized in ophthalmology for many years, and his contribution to this branch of medical science was indeed a great one. In *Useless for Ignoramuses* he described medicaments of plant, animal and inorganic

40. *Anchusa incana* Ledeb. (*Boraginaceae*).

origin that could be used for treatment of eye ailments. In this book he summarized a lot of data about medicinal herbs that were successfully used in the past.

Analysis of Amirdovlat's writings shows that in medieval phytotherapy of eye ailments of infectious and allergic nature (such as conjunctivitis, folliculosis, trachoma and its complications, blepharitis, keratitis, etc.) plants of the following families were used most often: *Apiaceae, Asteraceae, Fabaceae, Lamiaceae, Liliaceae.* Some of them (e.g., Fennel,[41] Horehound,[42] Plantain,[43] Sweet Clover,[44] Germander[45]) were also effective in treatment of other localized ailments of infectious and allergic origin. Some species of *Apiaceae* of common dietary usage (Fennel, Carrot,[46] Cumin[47]) were prescribed for eye ailments especially often. About Common Fennel Amirdovlat wrote: "It can be of wild and garden variety. The best is one that is green and young. Its nature is hot and dry in second degree. . . If its juice is put into eyes, then eyes become shiny and eyesight is improved. If starting from the first day of spring, when the Sun is in the house of the Aries, and until it is in the house of Cancer, i.e. until the first summer day, one will eat one *mtkhal* of Fennel seeds with sugar, then during the whole year one will not contract a disease" [43:324]. According to contemporary data, Fennel's essential oil contains anethole, fenchone, pinene, camphene, phellandrene, and some other components [149:256].

Carrot seeds were also of medicinal value, and Amirdovlat recommended using them with honey for treating keratoleucoma.[48] It is worth noting that Carrot seeds were also considered a tonic that enhanced sexual potency. The hormonal properties of Carrot seeds were also noticed in traditional Indian medicine. Contemporary data shows that essential oil of Carrot seeds contains pinene, geraniol and

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41. *Foeniculum vulgare* Mill.

42. *Marrubium vulgare* L. (*Lamiaceae*).

43. *Plantago major* L.

44. *Melilotus sp.*

45. *Teucrium sp.*

46. *Daucus carota* L.

47. *Cuminum cyminum* L.

48. Lat. *caligo corneae.*

some other compounds that are also common in other medicinal plants with antiallergic and antiinflammatory properties. In addition to that, the flavonoid drug named Daucarin, recently isolated from Carrot seeds, possesses vasodilatory and spasmolytic properties [138:2:171].

Many plants from the *Asteraceae* family found their use in medieval phytotherapy of infectious and allergic eye diseases. Among them are Burdock,[49] Ptarmica,[50] Dillweed,[51] Cornflower,[52] Chicory,[53] Chondrilla,[54] Thistle,[55] and Artemisia. In Amirdovlat's pharmacognosy we have the following passage about Burdock: "It is a herbaceous plant, with fruit similar to Caraway's. And its root is small, soft, and of sweet taste. The part that is above ground can be long and friable. If [the root] is thoroughly pulverized and [then the powder] is put over the burned spot, then the mold is expelled from the body; it also helps to heal [mold] ailments of the eyes." [43:86]. Representatives of the genus *Arctium* contain the glycoside arktiine ($C_{23}H_{38}O_{12}$), and some species (e.g., *A. minus* L.)—a sesquiterpenoid lactone, arktiopicrine, as well as some compounds with antibiotic properties. In the roots of a common weed of Armenian flora, *A. lappa* L. glycosides, volatile oils, phytosterines and tannins were found, whereas the leaves contain ascorbic acid and carotene [138:2:297]. The presence of these compounds to a certain degree explains the healing action of Burdock on ophthalmologic diseases that was empirically elucidated by the Armenian *bzhshkapet*.

The juice of another plant—Ptarmica, possesses, according to *Useless for Ignoramuses,* antiinflammatory and resolving action. "This plant has long leaves like the Olive tree. And its stems are like the stems of Mugwort.[56] If ground flowers and leaves are applied to the eyes, then [the eye's] swelling and hemorrhage is cured" [43:534]. Eyewashes of

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49. *Arctium sp.*

50. *Ptarmica vulgaris* L.

51. *Anthemis sp.*

52. *Centaurea sp.*

53. *Cichorium inthybus* L.

54. *Chondrilla juncea* L.

55. *Carthamus sp.*

56. *Artemisia vulgaris* L.

Wormwood,[57] which was a common species throughout Armenia, were used for the same purposes. Amirdovlat also noticed its emmenagogic properties. The plant contains bitter glycosides (absinthine, anabsinthine), organic acids, essential oil (which contains thujone, phellandrene, sesquiterpenes, tannins, vitamin C, B_6 and carotene) [158:286].

For the treatment of trachoma and its complications (pannus, trichiasis, walleye) medieval physicians prescribed Chicory juice and the resin of Chondrilla. Amirdovlat wrote about Chondrilla: "Its power is similar to garden Chicory. . . . Its resin cures hairs ingrown in the eye. Its root does the same. And if the resin is mixed and ground with Chicory juice [and] applied to the eye—pannus is cured" [43:218]. Chondrilla is found in Armenian flora. Latex and resins were found in its roots.

Another plant of the Armenian flora closely related to Chondrilla—Chicory—is much better studied. Its roots contain glycosides chicoriine and intibine as well as tannins, its juice—latex and sesquiterpenoid lactones lactucine and lactupicrine. The plant possesses bactericidal properties. Apart from eye ailments Amirdovlat also recommended its juice to cure liver and stomach ailments as well as chronic fevers, emphasizing that Chicory juice "expels moldy moisture" from the body.

Plants of the *Fabaceae* family were also very popular in medieval ophthalmology. Gums derived from certain representatives of the genus *Astragalus* (e.g., *A. sarcocolla* Dun., *A. microcephalus* Willd.) were considered helpful in the prophylaxis and treatment of cataracts, whereas the juice of Camelthorn[58] was used to treat walleye. The juice of another plant, Licorice,[59] was recommended by Amirdovlat for *pterygium*. "The fresh juice of [Licorice] put in the eye cures [*pterygium*] and [eliminates] wild meat. . . Pounded dry root applied to the eye causes the same" [43:541]. According to contemporary data, roots of Licorice contain glycerretic acid that has action similar to desoxycorticosterone, as well as some flavonoids [158:301]. Pharmaceuticals derived from Licorice possess antiinflammatory, antiallergic and estrogen activities.

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57. *Artemisia absinthium* L.

58. *Alhagi maurorum* Medic.

59. *Glycyrrhiza glabra* L.

Aloe[60] juice was used in ophthalmology from ancient times. Amirdovlat considered it useful for treatment of ulcerous keratitis, for increasing acuity of vision and conjunctivitis prevention. Juice of another Liliaceous plant—Orange Daylily[61]—was prescribed for the treatment of festering eye infections and burns.

An infusion from Barberry[62] bark was used in the past for prevention and treatment of eye diseases. In *Useless for Ignoramuses* Amirdovlat wrote: "If [Barberry's root bark] is taken and soaked in Rose water, and such water is put in the eye, then it will help to stop epiphora and will treat a chronic eye illness. If [such water] is put in the eye of a healthy person, then this will prevent any eye illnesses" [43:27]. Barberry is found in Armenian flora. It contains an alkaloid berberine ($C_{20}H_{18}O_4$) and tannins. In contemporary medicine berberine is used for treatment of leishmaniosis and uterine bleeding.

Plants such as Mullein[63] and Common Toadflax[64] from the *Scrophulariaceae* family were considered effective against eye inflammations. Amirdovlat wrote the following about Mullein: "If its leaves are boiled in water and plaster is made, and [the plaster is] put on a mucilaginous tumor or on eye tumor, which is accompanied by redness, then it helps. And if plaster is made with honey and wine, and [the plaster is] put on a snakebite, [this] also helps. And [it also] helps against scorpion bites and malignant ulcers" [43:483]. According to contemporary data, Mullein contains essential oils, coumarine derivatives and flavonoids. It also possesses antibiotic properties [155:132]. In Armenian folk medicine it is used for treating digestive tract ailments and to fight tuberculosis [112:97].

As we can see, in medieval Armenian medicine, rational methods for treatment of many eye illnesses were developed. Many of the above-mentioned plants possess antibacterial, antiallergic and antiinflammatory properties due to the presence of essential oils and their components. Hormonal compounds, that stimulate metabolic

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60. *Aloe vera* L.

61. *Hemerocallis fulva* L.

62. *Berberies vulgaris* L.

63. *Verbascum thapsus* L.

64. *Lnaria vulgaris* (L.) Mill.

processes, and are found in these plants, play an important role in resorption of inflammatory infiltrates, cornea cloudiness and in treatment of cataracts. It is also worth mentioning a widespread use of vitamin-rich (C, provitamin A, B_1, B_2) plant medicines against such diseases as cataracts, night blindness and sty, in pathogenesis of which vitamin deficiency plays an important role.

In addition to phytotherapy, inorganic compounds were often prescribed in medieval Armenian ophthalmology. Among them are compounds containing iron, lead, zinc, mercury, arsenic, sulfur, and also medicines prepared from precious stones: turquoise, sard, lazurite, malachite and gagate. Against ulcerous keratitis, zinc oxide was often used. About zinc oxide Amirdovlat wrote: "It possesses drying properties, protects eyes from illnesses, heals eyes, and does not allow moisture to descend towards [the eye's] membranes, and also stops epiphora. . . It dries moist ulcers. [It] helps against cancer. It is a part of eye medicines" [43:174]. Zinc oxide is used as an astringent in contemporary medicine. Iron oxide was used in medieval medicine for the same purpose. Precious stones were used mostly to increase acuity of vision, and rarely for treating of diseases (ulcer, walleye). Pearls were especially popular in the East, about which Amirdovlat wrote: "They dry moist ulcers, strengthen the eyes, protect them from diseases and remove walleye" [43:204].

Medicines of animal origin were also used in medieval ophthalmology: musk, castoreum,[65] liver and bile of partridge, bat's brain, pigeon's blood and some others. Bile of some animal species was considered effective against cataracts, glaucoma and night blindness. "There are many kinds of it. The best bile is of green color. It prevents eyes from the onset of cataracts and glaucoma", wrote Amirdovlat. The enormous ophthalmologic experience of the Armenian *bzhshkapet* that found its expression in *Useless for Ignoramuses* would prove invaluable to contemporary medicine.

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65. Castoreum is a secretion of a musk gland of male beaver (*Castor fiber* L.). It contains resin, essential oil, cholesterol, castorine, albumin, various acids and salts.

Treatment of neurological and psychiatric diseases

Among many medicinal plants of Amirdovlat's pharmacognosy there was a large group of herbs used for treatment of neurological and psychiatric diseases. In the origin of many of such diseases, infectious and allergic factors play an important role. Moreover, recent research shows an equally important role of vasoactive prostaglandins of exogenous as well as endogenous nature in the etiopathogenesis of neurological and psychiatric diseases [159]. Analysis of medicinal herbs has proven the following families as most effective for treatment of such diseases: *Apiaceae, Asteraceae, Lamiaceae, Liliaceae,* and *Fabaceae.* These families, as was mentioned before, were effective against infectious and allergic ailments of other organs (e.g., eyes and kidneys).

Plants of the *Apiaceae* family had proven to be especially active in the treatment of brain arteriosclerosis and hypertonic disease, epilepsy, migraine, sciatic neuralgia,[66] neuritis of facial nerve and some other ailments of neuropsychiatric nature.

Coriander had an especially broad spectrum of action. About Coriander Amirdovlat wrote: "It can be of the wild and garden variety. The best kind is a garden one. It possesses distracting qualities. [It] prevents vapors from rising up into the head. [It] makes people sleepy; and it belongs to the group of medicines that are helpful against [thrombosis]. It helps in cases of falling disease[67] of hot nature. If rubbed onto the body it also helps. . . Freshly squeezed juice eliminates burning sensations in the mouth and also helps against hot swellings, nettle rash and erysipelas. It helps against carbuncles if anointed along with honey" [43:115]. The curative activity of this plant is thought to be linked to some of the components of its essential oil: linalool, pinene, cymol, borneol, phellandrene and alkaloids [138:2:171]. Coriander's green parts contain vitamins (E, carotene) and are used as food.

In medieval medicine Hog's Fennel[68] was used against a whole array of nervous system ailments. It is said in Amirdovlat's pharmacognosy: "If its juice is mixed with vinegar and rose oil, then [such a mixture]

66. Lat. *ischias.*

67. Common name for epilepsy.

68. *Peucedanum officinale* L.

helps against lethargy, dizziness, falling disease, persistent headaches, paralysis and sciatic nerve disease. And if its juice is mixed with vinegar and olive oil, and [such a mixture] is rubbed onto [the body], then nerve ailments would be cured" [43:131]. Apart from an essential oil, the plant contains furocumarine ($C_{15}H_{14}O_4$), from which a contemporary antitumor medicine named *Peucedanin* was made. *Peucedanum luxurians* Tamamsch, common in Armenian flora, is an important source of *Peucedanin.*

Amirdovlat wrote the following about another plant that is very close to Hog's Fennel in its properties and chemical composition—*Prangos ferulacea* (L.) Lindl.: "If its root is dried, pulverized, mixed with honey and applied to malignant ulcers, then [such an ointment] will help. . . If [the powder made] from the root is mixed with honey and applied to the eyes, then eyesight is enhanced. And if [the root] is imbibed with pepper and wine, then [such a drink] helps against falling disease" [43:199]. Resinous exudates of *Prangos* root found its use in folk medicine for treating gynecological diseases. This plant is found at foothills as well as in alpine areas of the Armenian mountains. Apart from an essential oil that has a balsamic and slightly musky odor, the plant contains some derivatives of coumarin and furocoumarin [138:2:179].

Gums of several plants of the genus *Ferula: F. gumosa* Boiss., *F. persica* Willd., *F. szowitsiana* DC. as well as Ammoniacum[69] were recommended by Amirdovlat for treatment of inflammations of nervous system and some other organs. He wrote about Gum Ammoniac[70]: "This gum is white in color. It helps against falling disease, thickening of eyelids and eye inflammations. . . If [mixed] with vinegar and applied, then [such ointment] helps against hot and thick swellings and bone diseases. [Gum Ammoniac] removes rotten meat from ulcers and helps to cure disease of the sciatic nerve" [43:94]. The composition of Gum Ammoniac is well studied at the present time. It contains resinous materials (42–72%), gum (11–26%) and essential oil, comprised of linalool, citronellol and doremol [160:164]. The resin of

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69. *Dorema ammoniacum* D. Don.

70. A gum-resin exuded from the flowering and fruiting stems of *Dorema ammoniacum* D. Don.

the native Armenian species *Dorema glabrum* F. et M. can serve as a substitute for Iranian *oshakh*.[71]

Galbanum[72] possesses similar properties. It contains galbanic acid, a derivative of umbelliferone that has tranquilizing and hypotensive properties. In the molecule of galbanic acid there is also a sesquiterpenoid component with antibacterial activity [161].

In medieval phytotherapy of neurological and psychiatric diseases several plant families that contain alkaloids and glycosides are mentioned especially often. Among them are *Liliaceae*, *Ranunculaceae*, *Salicaceae* and *Zygophyllaceae*. The root of White Hellebore[73] was considered in the past as an effective treatment for a variety of neurological and psychiatric as well as some skin diseases. About Hellebore it is said in *Useless for Ignoramuses*: "It helps to cure falling disease and paralysis. It kills lice. It helps against 'fox disease'[74] and eradicates freckles. It cures herpes if rubbed into skin. It helps to cure sciatic nerve disease and lower back pain" [43:211]. The Armenian species *Veratrum lobelianum* Bernh. is used in folk medicine against skin diseases. According to contemporary data Hellebore contains steroid alkaloids—rubijervine, isorubijervine ($C_{27}H_{43}O_2N$), germitetrine, germine and some other compounds that possess hypotensive properties, but their use is limited because of high toxicity [160:618].

Another Armenian plant that possesses hormonal activity is Syrian Rue.[75] Amirdovlat recommended this plant to cure a whole array of ailments of neuropsychiatric nature. "If [its seeds] are mixed with wine and [this mixture] is imbibed, [this will] help to cure falling disease. They possess psychotropic properties. If [seeds] are mixed with honey and applied to eyes, then eyesight will become sharper. It helps in cases of black bile diseases and anxieties, and also eliminates worries. It promotes copious urination and menses and expels the fetus from the womb. . . Ibn [Baytar] said, that if in the course of 12 days one *mtkhal* of whole seeds is taken, then [such treatment] will cure sciatic nerve

71. A special kind of Iranian gum-resin.

72. *Ferula galbaniflua* Boiss.

73. *Veratrum album* L.

74. Lat. *alopecia*.

75. *Peganum harmala* L.

disease" [43:247]. This plant is a common weed in the Armenian foothills. It is used in folk medicine of many countries and, for example, in India is used as an abortifacient. All parts of the plant, and especially seeds, contain alkaloids: harmaline ($C_{13}H_{14}ON_2$), harmalol, harmine and peganine. Pharmaceuticals containing substances from Syrian Rue were once used to treat diseases of extrapyramidal system and aftereffects of epidemic encephalitis, Parkinson disease and trembling paralysis [160:124], but because of their high toxicity were discontinued.

In the East, Peony root was considered one of the most effective medicines against epilepsy. Amirdovlat wrote: "It helps a patient that is suffering from the falling disease, if taken internally or kept on [patient's] body. Peony fruit helps [against] nightmares. If it is hung on the neck of a patient that is suffering from the falling disease, this helps as well. . . If a fumigation with its root and fruit is undertaken while the patient is having an epileptic seizure, then [such a procedure] helps [to stop the seizure]. It [also] helps the wanderers in deserted places" [43:619]. Classics of Eastern medicine (Ibn Sina, Ibn al-Baytar) had treasured Common Peony[76] as an effective anticonvulsive medicine.

The roots of *Paeonia suffruticosa* Andr. and *P. anomala* L. were also used medicinally. In the root of the latter species was found an essential oil that contains salicylic acid and its derivatives—peonol ($C_9H_{10}O_3$), methylsalicylate and the glycoside salicyne ($C_{13}H_{18}O_7$). A closely related species—*P. tenuifolia* L. is found in Armenian flora. Its flowers contain peonynechloride that possesses antibiotic properties [138:2:40]. Clinical trials of pharmaceuticals containing *P. tenuifolia* confirmed findings of Eastern medicine concerning anticonvulsive properties of this plant [162]. This proves an ever-increasing need for an in-depth study of medieval Armenian pharmacognosy, so its invaluable heritage can find its use in contemporary medicine.

Apart from phytomedicines, some animal-derived medications (rennet extract from hare stomachs, bear bile, partridge liver, weasel brain, *castoreum*, musk, etc.) were often used in the past to treat ailments of neurological and psychiatric nature. Some of these medications (e.g., *castoreum*, musk) were thought to possess tonic properties, whereas others (rennet extract, liver medicines) were

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76. *Paeonia officinalis* L.

considered antitoxic. It was customary to prepare complex mixtures containing not only plants, but also animal components. An aromatic mixture called "*galia*" made of musk, ambergris and camphor oil, was quite popular for treating migraine headaches and epilepsy. In Armenian medicine, as well as in eastern medicine in general, a lot of attention was paid to medicinal action of various aromas. That explains why in complex recipes intended for treating neurological and psychiatric patients, aromatic compounds, such as musk and ambergris, were almost always present, and were sometimes also used to fumigate patients.

In medieval Armenian medicine, methods of suggestive psychotherapy were also used. Mkhitar Heratsi was successfully using them against psychogenic allergies, and recommending music as the most effective method that restores spiritual harmony, and for treating depressive conditions. Amirdovlat emphasized the importance of words coming from the physician and other people, in healing the patient, especially if such words were said while the patient was in a suggestive mood. Amulets made of organs and tissues of special animals as well as roots of medicinal plants were also used in medieval medicine, where magic traditions were still very powerful. In *Useless for Ignoramuses* there is a very peculiar magical ritual of a tribe that used to live on Socotra: "Women there practice magic and lechery. If two people are hostile to one another, and one of them is a foreigner and is marked for ruin, then a witch is called [to help]. And that [witch], if she wants to bewitch [that individual], holds his name and appearance in mind, reads [spells], puts a bowl [filled with] water in front of her, and exercises her witchcraft until a drop of blood appears in water, and then, liver, heart and lungs appear [in the bowl]. At this very moment that individual will die. And if the belly of that individual is cut open—no liver, heart and lungs are to be found [inside]. Such great skills [these witches] possess" [43:519–520]! However, according to Amirdovlat, this tribe did not use much magic medicine, and was quite successful in rational methods of healing, and was making a famous Socotrian "*sabur*," which was considered very effective against psychiatric ailments for it "clarifies the head of excessive moisture, helps against melancholy and strengthens the mind" [43:520].

Overtones of such magical beliefs could be heard in advices like "hang Peony root on the neck of a patient suffering from the falling

disease," or in precautions that should be taken while digging up Mandrake root. In this case, the right moment for digging was determined by astrological means: "This root should be dug while Mars is on 24th step [of the sign] of Aries or Capricorn, and the Moon is close to Mars, and both of them are in the same house of Zodiac, while the day of the week is Tuesday, and time—after sunrise. Then dig from four sides, so the [Mandrake] tilts, then bring a dog, which has been hungry for several days; tie a rope to the [dog's] foot, and tie another end [of the rope] to the root, after which leave and call the dog. It (the dog) will pull and uproot the root, [but the dog] will die [afterwards]" [43:506]. However the same root, while used as an amulet, also possessed rational properties for treating nervous system ailments, for it, according to Amirdovlat, helps "to cure falling disease, melancholy, all black bile sicknesses, paralysis, facial distortions, leprosy, madness, forgetfulness and [obsessive behavior]." Apart from rational data, Amirdovlat also mentions some legendary properties of Mandrake, adding the following: "Behold, a lot of contradictory things were said about it, and it is difficult to verify what is true." Nonetheless, desire to verify and separate legends from reality was always characteristic of the Armenian *bzhshkapet*, urging him to use experiment as the only criterion of the truth, many examples of which can be found in the book *Useless for Ignoramuses*.

Treatment of malignant and benign tumors

Pharmacological treatment of cancer is one of the main problems of contemporary medicine. It was of great importance even in Amirdovlat's time, since in his pharmacognosy he described a great variety of plant-derived antitumor medicines.

From a large group of antitumor agents, the ones that deserve attention in the first place are those that Amirdovlat recommended for treating cancers of internal organs (*khechapar* in Middle Armenian, *saratan* in Arabic terminology), skin cancer and dense tumors (*pind urets*) of the *scirrhus* type. Even Hippocrates referred to the last type as malignant formations [82:427]. A large number of the plants that belong to this group come from families that contain alkaloids and

glycosides: *Anacardiaceae, Apiaceae, Asteraceae, Cucurbitaceae, Fabaceae, Lamiaceae, Liliaceae.*

Some representatives of *Apiaceae* that were used in medieval antitumor therapy were also known to possess antiallergic and antiinflammatory activity. Among them there is a concoction from Hog's Fennel roots that was used to treat burns and cancerous ulcers. Interest in this ancient medicine is still alive in contemporary oncology, and peucedanine was found to possess antitumor activity by the Russian scientists E. Vermel and S. Syrkina-Kruglyak [163:225]. A preparation from the common Armenian weed—Sea Holly,[77] was used by medieval Armenian physicians for the same purpose. Al-Biruni wrote in *Saidana* about Sea Holly: "This plant is brought from Armenia" [69:4:305]. Amirdovlat described it as follows: "Armenians call it *yerndjan.* It grows in dry places on rocky soil. It belongs to a class of [prickly plants]. When [it] comes up from the ground, green and dense leaves appear first and spread around over the soil, [and], when it ages, white spines appear. It reaches up to one [*palm*] in [height], but can be even taller. Its flower is white with a dash of red around the margins. And there are six spines on it. Its root is strong, as thick as a thumb, and up to three—four [*palms*] long. A bee collects pollen from its flower and makes honey. Its root helps to treat chest ailments and animal bites. A medicine from [its root] resolves tumors. And the dose to be taken at one time is two *drams*" [43:304]. The plant contains volatile oil with ambergris and musk fragrance, as well as saponins, flavonoids and tannins.

Another representative of the *Apiaceae* family, *Echinophora tenuifolia* L., possesses a combination of antitoxic and antitumor properties similar to Sea Holly. It is said about it in *Useless for Ignoramuses*: "This little tree is much like Asafoetida[78]. . . It treats liver tumor and stops mucus accumulation in the stomach. It helps against snake and scorpion bites if taken internally or rubbed. The dose to be taken at one time is one half of a *dram* and its harmful effect is that it dries semen" [43:160]. In ancient times *Echinophora* was considered a panacea that has an ability to heal many ailments. Dioscorides called it *Panaces Asclepion.* Prostaglandins and prostaglandin-like compounds

77. *Eryngium campestre* L.

78. *Ferula assa-foetida* L.

[164] that have a broad spectrum of therapeutic activities may be responsible for the conjugated antitoxic and antitumor effects of *Echinophora*. Some other plants, for example Bryony,[79] are known to possess similar activity, and will be discussed in detail later. Interestingly enough, Asafoetida, that Amirdovlat said to superficially resemble *Echinophora*, also has similar therapeutic effect. "It eliminates the deleterious effect of malignant tumors and animal bites, writes Amirdovlat, and also helps to treat scorpion bites, and sciatic nerve disease" [43:271].

The fact that an antitumor drug may possess antitoxic properties is very important, since during the late stages of malignant tumor development, the human body suffers from toxins produced by the tumor. According to contemporary data, *Ferula assa-foetida* contains resin (9–65%), gum (12–48%), and essential oil (5–20%) in which pinene, oxycoumarin, and sulfides with unpleasant smell are also found. Ferulic acid ($C_{10}H_{10}O_4$), rezene, rezitanol, and rezinol were isolated from the resin [165:148].

In the past, antitumor agents were also derived from several species of Sumach, such as *Rhus coriaria* L. and *R. retinorrhooea* St. Amirdovlat recommended them for treatment of skin cancer. Amirdovlat wrote about Sicilian Sumach (*Rhus coriaria*): "Sumach consolidates the nature and eliminates nausea. [It] heals scratches and abrasions; [it] stops bleeding from any spot, and helps to cure hemorrhoids. [It is also] good for bruises and swellings. [Sumach] prevents a swelling from enlarging. [It] also heals malignant ulcers, and helps cure cancer. But [Sumach] is bad when the liver has a cold nature" [43:540]. Medicinal and, especially, antitumor activity of Sicilian Sumach fruits and leaves is probably caused not only by abundant vitamins and tannins, but also by little studied alkaloids, that were also found in the plant [138:2:136].

Another species of Sumach—*Rhus retinorrhooea* St. possesses similar properties. In *Useless for Ignoramuses* Amirdovlat wrote: "This plant grows on river banks. It has very long leaves. It could be as tall as two humans. Sumach resembles Salsify.[80] If its leaves are pulverized and applied to scalp, then this will strengthen [the hair]. . . If poultice is

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79. *Bryonia sp.*

80. *Tragopogon sp.*

made and applied to firm and black bile tumor, this helps. And if [such medicine] is applied to cancerous tumor, then it helps also" [43:534]. Further investigation of these little studied plants may prove to be invaluable for contemporary oncology.

According to Amirdovlat, skin cancer and dense tumors were treated with the medicine prepared from Roman Nettle[81] seeds. "If [this medicine] is applied with salt to hemorrhoids, this helps. [This medicine] also softens dense tumors, and resolves cancerous tumors. If [this medicine] is applied with salt to an ulcer, then [this medicine] cleanses [the ulcer] and heals it. It also helps if applied to a cancerous ulcer. Seeds [of this plant] redden the skin and cleanse it" [43:60]. This medicine was commonly made of powdered Nettle leaves mixed with honey. Another Nettle species of Armenian flora—Stinging Nettle[82] was widely used in folk medicine as diuretic, emmenagogic and haemostatic. Amirdovlat also pointed out antiallergic, lytholitic and hormonal (increasing sexual potency) properties of the plant. According to contemporary science, various species of Nettle contain alkaloids, glycoside urticine, tannins, vitamins (C, carotene, E, K, group B), as well as some biologically active compounds, some of which may be similar to prostaglandins [151:142].

In medieval phytotherapy two species of the glycoside-rich family *Cucurbitaceae* were used as antitumor medicines: White Bryony[83] and Squirting Cucumber.[84] Here's how fruits of the latter were used to prepare medicines: "Fruits are taken in the last summer month when [they] become yellow; their juice is filtered through linen cloth, purified, and left protected from dust to dry in a vessel, [then] little pastilles are made [from the dried juice]. If a plaster with barley flour is made from the root [of this plant], then [such a plaster] helps to cure a mucilaginous tumor"[85] [43:315]. Glycosides with antitumor activity—elatericines A and B, were isolated from Squirting Cucumber juice [138:2:286]. This plant is a weed common to Armenian flora. It is

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81. *Urtica pillulifera* L.

82. *Urtica dioica* L.

83. *Bryonia alba* L.

84. *Ecballium elaterium* (L.) Rich.

85. Lat. *myxoma*.

widely used in folk medicine. Amirdovlat noticed a strong emmenagogic and abortifacient activity of this plant's juice. Common to Armenian flora White Bryony also possesses all these properties and is very popular in folk medicine. Amirdovlat wrote: "If a plaster with salt is made from fruits, leaves and roots of this plant, and applied to malignant ulcers, then [such a plaster] helps [to cure ulcers]. And if a root is mixed with Fenugreek[86] and [such a mixture] is rubbed onto skin, then [it] cleanses [the skin] from freckles and blotches and removes warts[87]. . . . If three *drams* are taken every day for thirty days with vinegar, then [this will] soften the spleen" [43:608].

According to medieval Armenian pharmacognosy, apart from being emmenagogic, abortifacient, and lactiferous, medicines made from White Bryony also possess antitoxic properties. Chemical analysis have shown that plant's roots contain tetracyclic terpenes: cucurbitacines (that possess cytotoxic antitumor activity) as well as other compounds: glycosides of cucurbitacines, pentacyclic tryterpenic acids and lipids [166]. The unsaturated fatty polyoxyacid fraction of White Bryony roots was shown to possess prostaglandin-like activity [167].

The root of Leopard's Bane[88] was recommended by Amirdovlat as a substitute for White Bryony: "It helps to cure throat pains, strengthens heart and cures [tachycardia]. . . [It] also helps to cure all kinds of tumors and all sorts of winds. And [it] also helps against all kinds of animal bites if eaten or [if its juice is] applied [thereon]" [43:555]. Another species of Leopard's Bane, *Doronicum pardalianches* L., possessed according to Amirdovlat equally valuable properties: "If a poultice is made [from its leaves] and applied to warts, then [the warts disappear]. But, for God's sake, do not drink its juice, it is poisonous! If its leaves are ground with lard, mixed with bread, and then fed to a fox, or a dog, or a leopard, or a wolf, or a pig, then they will drop dead in an instant. And if a poultice is made and applied to a dense tumor, then [the tumor] will be quickly resolved" [43:205]. The fact that these species of Leopard's Bane are poorly studied makes it difficult to elucidate an actual mechanism of the plant's antitumor action.

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86. *Trigonella foenum-graecum* L.

87. Lat. *verruca.*

88. *Doronicum scorpioides* Lam.

Pharmacological properties of evergreen plants of the genus *Vinca* are much better studied. One of its representatives, Red Periwinkle,[89] contains hypotensive alkaloids as well as vinblastine and vincristine that possess antitumor activity and are widely used in contemporary oncology [149:379]. Lesser Periwinkle,[90] that was cultivated in the Caucasus region and Armenia is also described in Amirdovlat's pharmacognosy: "This plant is a creeper. It has long and slender stems, very much like stems of Couch-grass.[91] Its leaves are small and are like Bay leaves, but smaller. If one would eat a leaf with a twig, then diarrhea caused by an intestinal ulcer will stop. And if [its] juice is mixed with milk, boiled with rose oil and given to a woman to insert into her vagina, then the womb diseases will be cured. It protects [one] from the detrimental action of animal bites. . . If suppositories are made and inserted into the anus, then stomach tumors will be cured" [43:308]. Armenian flora has another alkaloid-rich species—*Vinca herbacea* Waldst. et Kit., the antitumor activity of which is not yet studied [138:2:203].

Autumn Crocus[92] is still another example of how a medicinal plant used in medieval medicine found its way into contemporary oncology. Amirdovlat wrote about Autumn Crocus: "This is a plant's root that looks like chestnut. It can be of black, red and white color. The white one is the best. . . It has an amazing action. [It is] rather helpful against malignant ulcers. [It] helps if taken internally as well as rubbed [externally]" [43:536]. The alkaloids colchicine ($C_{22}H_{25}O_6N$) and colchamine were one of the first compounds of plant origin to be used in contemporary oncology. Studies of colchicine and some other colchicine-like antineoplastic medicines such as vinblastine and peucedanine have shown that all of them are mitotoxic poisons that prevent mitotic spindle fibers from forming during the metaphase of cell division [149:300]. Antitumor activity of other Armenian species of the genus *Colchicum*: *C. zangesurum* A. Grossh., *C. speciosum* Stev., etc. is little studied.

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89. *Vinca rosea* L.

90. *Vinca minor* L.

91. *Agropyron repens* Beauv.

92. *Colchicum autumnale* L.

In addition to phytotherapy, animal-derived medicines, inorganic compounds as well as medicines of a mixed nature were often prescribed in medieval Armenian oncology. Amirdovlat especially praised rennet extract from hare stomachs: "If some [extract] is taken internally with vinegar, then [this will] help in case of the falling disease.[93] And half a *mtkhal* of [the extract] is an antidote against all kinds of animal bites. . . If a cancerous tumor is anointed with [the extract], then it helps as well. If it is given to children to drink, then [it] cures falling disease. And all kinds of rennets have same beneficial properties" [43:58]. Here we see again an example of antitumorous activity in conjunction with antitoxic, the property quite often seen in phytopharmaceuticals, but this time observed in animal-derived medicine that also possess fermentative activity. Myrozine—an enzyme similar to rennet enzyme, was also isolated from some plants, for example from Hedge Mustard,[94] which was used in medieval phytotherapy to treat cancer.

It was quite characteristic of Eastern medicine to use a whole array of medications of extremely complex, and even esoteric nature, the mode of action of which could only be elucidated by methods of contemporary science. Among them is the so-called pigeon stone. "This stone, wrote Amirdovlat, forms in the pigeon's stomach. If a medicine is made of it, then womb cancer can be cured. This is one of the best medicines against cancer. [It is] proven" [43:260].

A tumor of the mammary gland was treated in the past with medicine made of ostracite, a special kind of limestone from the fossilized mollusks. "This stone [can be found] in abundance in Egypt, wrote Amirdovlat, it looks like clay crocks; [it] breaks easily. It is flaky, like tree bark; [it] eliminates hairs. If two *drams* of it are ground with wine and then imbibed, then [this] will stop menses. And if mixed with honey and applied to a mammary gland tumor, then [it] will cure the ulcer and resolve the tumor" [43:260].

Precious and semi-precious stones such as coral, pearl, and amber were also used in medieval medicine to treat tumors. Here's what the Armenian *bzhshkapet* wrote about amber: "The clear and transparent kind is the best one. . . It stops bleeding from any spot. And if wounds

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93. Epilepsy.

94. *Sisymbrium officinale* Scop.

on the feet were anointed with [an ointment made of amber and] oil, then [the wounds will] heal. And if [amber is] tied over a tumor, then [such a procedure] also helps [to cure the tumor]" [43:598]. The blind faith of medieval medicine in the ability of stones to cure diseases is replaced nowadays by equally blind negation of this ability in contemporary medicine. However, a new and promising tendency to study experimentally and use parts of the ancient lore concerning medicinal stones had recently found its way into contemporary pharmacognosy.

Armenian clay[95] that has in its composition alumosilicates and iron oxide (which is responsible for clay's specific red coloration), had a particularly important place among antitumor remedies of inorganic origin. "Red [clay] is the best kind [of clay], wrote Amirdovlat, Armenian clay helps [to fight] colds and mammary gland tumors. . . [This clay] also helps [against] fevers and infected air" [43:576]. In ancient and medieval times Armenian clay was exported into Eastern countries, and successfully competed with Greek clay on the marketplace. Later it was gradually forced out of scientific medicine, but in recent times an interest to this intriguing remedy has substantially grown.

Treatment of geriatric diseases

Problems of longevity and the treatment of geriatric diseases that were originally posed in ancient medicine by Hippocrates and later studied by Ibn Sina in his *Canon*, found further development in medieval Armenian medicine. The works of Amirdovlat contain a lot of invaluable information concerning the increasing of the life span, prophylaxis and treatment of geriatric ailments (brain arteriosclerosis with marasmatic symptoms, geriatric cataracts, deafness, bronchitis). Since ancient times Armenia, and especially its mountainous areas, was considered a country of long-livers. That could be best explained by country's climatic conditions and Armenian folk diet as well as traditional Armenian medicinal and medico-prophylactic practices. The

95. Lat. *bolus armena.*

book *Useless for Ignoramuses* is an excellent compendium of data on medicinal plants used in medieval Armenian geriatric science.

The majority of such plants belong to the families *Apiaceae, Asteraceae, Euphorbiaceae, Fabaceae, Lamiaceae* and *Liliaceae*. Among medieval Armenian geriatric phytopharmaceuticals, resinous gums of the family *Apiaceae*, and especially plants of the genus *Ferula*, deserve special attention. Various species of *Ferula* were recommended in cases of late stages of brain arteriosclerosis with symptoms of memory loss as well as in cases of lowered intellectual abilities as a result of a stroke with symptoms of paresis and paralysis. Such gums were also prescribed for increasing acuteness of sight and hearing, and for treatment of geriatric bronchitis and pneumonia.

The following is said in medieval Armenian pharmacognosy about *sagapenum*[96]: "The best is one that is red and easy to pulverize. [Its nature] is hot and dry in the third degree. [It] possesses dissolving and thinning properties. It is good for paralysis, falling disease and all kinds of nerve diseases of cold nature. It [helps against] the dimming of eyesight and the beginnings of a cataract. If a poultice is applied to tumors, then [it causes] the digestion of moisture. It helps [cure] scorpion bites. The dose to be taken [at one time]—one half of a *dram*. And *sagapenum* from Isfahan improves sexual potency" [43:527]. *Sagapenum* is excreted by an Armenian species *Ferula szowitsiana* DC. Apart from the Armenian *sagapenum*, *sagapenum* imported from Iran was also used. Opopanax[97] and gum of *Athamanta macedonica* Spreng. were prescribed in similar cases. About the latter Amirdovlat wrote: "[This gum] looks like Opopanax. The best kind [of this gum] is of yellow color, with a sharp smell. Its nature is hot and dry in the second degree, [and this gum possesses] dissolving properties. It helps [against dental] cavities.[98] It protects eyes from cataracts. And if applied onto eyes, then [the acuity of] eyesight is increased. It also helps [in cases of] falling disease and all kinds of brain diseases of a cold nature" [43:317].

For the treatment of geriatric diseases Amirdovlat eagerly prescribed resin-gums as well as *Euphorbium*, the milky juice of Milkweeds, plants of the *Euphorbiaceae* family. About solidified juice of *Euphorbia*

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96. Gum excreted by *Ferula szowitsiana* DC.

97. Gum excreted by *Opopanax persicus* Boiss.

98. Lat. *caries dentium*.

orientalis L. he wrote: "This is resinous stuff. . . It has a softening action. [It] helps [in cases of] headaches of cold nature, migraines, fox disease,[99] paralysis, numbness and distortions of face. It also helps [in case of] cataracts" [43:29]. This plant is common in Armenia and, according to contemporary data, contains alkaloids and triterpenic saponins [138:2:132]. In the past, another Armenian plant, Crenated Annual Spurge,[100] was considered effective against cataracts and a whole array of other diseases. "If its milky juice is applied to warts, then [such a procedure] helps [cure them]. And if [its juice] is mixed with honey, and the eyes are anointed [with such a mixture], then [such a procedure] eliminates eye pains and dimming of vision. [This juice] also prevents cataracts. And if a poultice [is made of the juice] and applied to a mucilaginous tumor, then [it] also helps" [43:213]. Unfortunately, the medicinal properties of this plants are not studied by contemporary science, but its medicinal applications, described by Amirdovlat, led us to believe that some compounds, characteristic of *Euphorbiaceae*, are present: triterpenes, alkaloids, phytohormones, etc.

Juice and fruits of Emblic Myrobalan[101] were also quite popular in medieval Eastern medicine. The following description of it was given by Amirdovlat in his *Useless for Ignoramuses*: "These are black fruits. . . [They] possess astringent and strengthening properties. They strengthen nerves and do not let people age quickly. [They] also strengthen hairs, make [hairs] black, and prevent them from falling out. And if eyes are anointed by oil [from this plant], then eyesight is sharpened. If [this plant] is powdered and [powder is] applied to eyes, then moisture is removed [from eyes]. [This plant] strengthens heart and sharpens mind. . . [It also] increases sexual potency" [43:49]. Milky juice and, especially, fruits of this plant possess antisclerotic and tonic properties, and were used in the East not only for medicinal applications, but also as part of the diet, for increasing longevity and preserving health.

Gums and juice of some *Fabaceae*, in particular Arabic Acacia[102] and Astragalus,[103] were also used as rejuvenants and tonics. As a cataracts

99. Lat. *alopecia.*

100. *Chamaesyce vulgaris* Prokh.

101. *Emblica officinalis* Gaertn.

102. *Acacia arabica* L.

preventative, gum *sarcocolla* derived from Iranian *Astragalus sarcocolla* Dun. was often used. Some Armenian species present special geriatric interest: *A. microcephalus* Willd. and *A. glycyphyllus* L. In the root of the latter species, glycyrrhyzin was found.

Numerous plants from the family *Liliaceae* were also prized by medieval Armenian geriatric science. Among them are Common Onion,[104] Aloe,[105] Lily,[106] and Sea Onion.[107] Amirdovlat recommended Common Onion as medication and preventative for many geriatric diseases: "If [Onion] juice is put into eyes at the beginning [stage] of cataracts, then [such treatment] will prevent [cataracts], cleanse the eyes, and improve eyesight. If [Onions] are fried in Rose oil and then eaten, this will help [against] mucilaginous cough. And [the Onion's] helpful qualities are that it [improves] appetite, softens the nature and increases sexual potency" [43:457]. Onions contain essential oils rich in sulfides, flavonoid quercetin, traces of iodine, and vitamins (C, B_1, B_2, provitamin A), i.e., a whole complex of substances, invaluable from geriatric point of view [151:164]. Apart from that, a prostaglandin-like hypotensive was also found in Onion juice [167].

According to Amirdovlat, the oil and juice of the Armenian Lily[108] prevent premature senile decrepitation, protect eyes from cataracts, and syrup made from the Armenian Lily helps to cure heart weakness. The Armenian *bzhshkapet* also recommended Lily in cases of Thorn Apple[109] poisoning and scorpion bites. Flowers, stems and, especially bulbs of many Lily species, contain alkaloids, sterins, and some other hormone-like compounds. The latter play an important role in mode of action of Colocynth,[110] which contain phytosterins and steroid glycoside elaterine ($C_{32}H_{44}O_8$). Amirdovlat wrote about Colocynth: "It possesses dissolving properties. [It is] quite useful [for the treatment of] brain

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103. *Astragalus sp.*

104. *Allium cepa* L.

105. *Aloe vera* L.

106. *Lilium sp.*

107. *Urginea sp.*

108. *Lilium armenum* (Misch.) Manden.

109. *Datura stramonium* L.

110. *Citrullus colocynthis* Schred.

diseases: paralysis, facial deformities and stroke. And [its] oil helps [in cases of] dumbness and earringing. [It] promotes beard growth. [It is] beneficial for teeth, lungs and at the initial stages of cataracts. . . And its root helps [against] snake and scorpion bites" [43:250].

Fig[111] juice and fruits were used in medieval geriatry for similar symptoms. Figs grow in Armenia wild as well as domesticated. Their leaves are rich in vitamin C, fruits contain provitamin A and vitamin B_1, while juice contains proteolythic enzymes, i.e., a whole array of compounds that produce beneficial effect in early stages of cataracts. Dog Rose[112] fruits are also quite rich in vitamins B_1, B_2, K, P, E, carotene, and, especially, C. It is widely spread in Armenian flora and often used in folk medicine. Amirdovlat wrote: "It dries eye ulcer and protects [eyes] from cataracts. And if the face is anointed with [its juice], then [the face would be] protected from the negative action of sun. . . If [its] fruits are dried and half a *mtkhal* is taken for several days, then sexual potency will be sustained and aging will be postponed" [43:407]. Kempferol, quercetin, salts of calcium, iron, potassium, magnesium, as well as some other bioactive compounds, long-term use of which promotes longevity and health, were found in Dog Rose fruits [151:267].

It is obvious that in medieval Armenian geriatry, plant species rich in alkaloids, glycosides, flavonoids, coumarin, and furocoumarin derivatives, as well as hormone-like compounds and vitamins were often employed. These compounds possess antisclerotic, bactericidal, and anti-inflammatory properties. Apart from that, plant hormones and vitamins, which these plants contain, act beneficially in cases of upset hormonal equilibrium and decrease in oxidative processes, quite characteristic in senile organism [168:49–77].

Apart from phytomedicines, some animal-derived medications, such as honey, bile, snake venom, liver of various animals, weasel brain, etc., found its use in medieval geriatry. Honey, that was a key part of many medications, was especially recommended as health- and youth-sustaining tonic. Here's what Amirdovlat wrote concerning its healing properties: "If put into the eye in the early stage of cataracts, then [it] helps. It cleanses the ears and improves hearing. . . [It] strengthens

111. *Ficus carica* L.

112. *Rosa canina* L.

sexual attraction,[113] cleanses malignant ulcers, and protects man from [all kinds of] damage. Boiled honey is helpful [in cases of] raw ulcers and animal bites, and is an antidote [against] opium poisoning. The dose—two *nuki*[114] at a time" [43:379]. Honey is rich in monosaccharides (glucose, fructose), vitamins (C, B group), organic acids (malic, citric), enzymes (diastase, catalase, lipase), mineral elements (potassium, sodium, calcium, magnesium, iron, iodine), and other biologically active compounds [70:61–68]. These compounds possess antibiotic, hormonal and antisclerotic properties. They also enhance a body's ability to resist diseases, have tonic action and, are therefore, instrumental in promoting longevity.

Treatment of hormonal disorders and poisoning

Ethiopathogenetic and symptomatic principles of therapy were empirically developed and widely used in medieval Armenian medicine. Very much as in contemporary medicine, medieval physicians preferred broad spectrum bactericidal and antiinflammatory medicines obtained from species of *Apiaceae, Asteraceae, Fabaceae, Lamiaceae* and *Rosaceae* which are devoid of narrow specificity. Some of them had antiallergic properties and were used for treatment of bronchial asthma, nettle-rash, as well as some other ailments where allergic factor played a major role. Essential oils and their ingredients (pinene, phellandrene, sesquiterpenoids, sesquiartemisol, thymol, borneol, etc.) were main active ingredients in these medicines.

Apart from essential oils, many plants from the *Apiaceae* and *Fabaceae* families contain other important active substances (e.g., coumarin, furocoumarin, and their derivatives) that possess a narrower spectrum of action: antineoplastic, lytholitic, antispasmatic, and tranquilizing. Their presence explains specific usage of such phyto-medicines in medieval Armenian pharmacology.

It is worth noting that gummiferous and resiniferous species, which found their use in therapy of malignant tumors and diseases of kidneys and nervous system, are abundant among these families, and, especially,

113. Lat. *libido sexualis.*

114. One *nuki* = 26.484 gram.

among *Apiaceae, Fabaceae* and *Rosaceae*. Contemporary chemical, pharmacological and biological research have confirmed that *galban*, Asafoetida, *sagapenum* and other gums and resins contain coumarine and umbellifrone derivatives, as well as some components of essential oils (terpenic alcohols, sesquiterpenic lactones, etc.).

Many plants from families *Apiaceae, Boraginaceae, Fabaceae, Lamiaceae, Zygophyllaceae* that were described in Amirdovlat's book *Useless for Ignoramuses* possess hormone-like activity. In ancient times, plants with hormonal activity were treated with reverence, which sometimes lead to cults of such plants (e.g., Bryony). Phytopharmaceuticals with hormonal activity that were mostly prescribed in cases where endocrine factor played the major role were sometimes used as antiinflammatory and antiallergic medicines. Some of them were prescribed as emmenagogic, abortifacient and birth control medicines (Sweet Flag,[115] Arum,[116] Gromwell,[117] Anchusa,[118] Common Heliotrope,[119] Syrian Rue,[120] Black Cumin,[121] and Opopanax), whereas some others were famous aphrodisiacs (*sagapenum*, Onion,[122] Wild Radish,[123] Coomon Sage[124]) and lactiferics (Bryony,[125] Caltrops[126]). Chemical and pharmacological analysis of these species reveal that their hormonal activity is due to the presence of coumarines, furocoumarines and their derivatives, phenolcarbonic acids and various phenolic compounds, flavonoids, sterines, steroid saponins, as well as steroid glycosides and alkaloids [169]. So, antigonadotropic and antineoplastic activity of

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115. *Acorus calamus* L.

116. *Arum sp.*

117. *Lithospermum officinale* L. (*Boraginaceae*).

118. *Anchusa incana* Ledeb. (*Boraginaceae*).

119. *Heliotropium europaeum* L.

120. *Peganum harmala* L.

121. *Nigella sativa* L.

122. *Allium sp.*

123. *Raphanus raphanistrum* L.

124. *Salvia sp.*

125. *Bryonia sp.*

126. *Tribulus terrestris* L.

Gromwell is caused by polymers of lythospermic acid, that belongs to the group of phenolcarbonic acids [170]. Estrogenic activity of many *Psoralea* species is linked to the presence of furocoumarines (psoralene and isopsoralene) and phenolic compound drupacine.

Among the above-mentioned plant species there is a group of plants with antitoxic and desensitizing properties. The majority of them belong to plants rich in essential oils, from the *Apiaceae, Lamiaceae* and *Asteraceae* families. Some of them possess hormonal activity (*sagapenum*, gum of *Athamanta*,[127] Wormwood, Horehound, Bryony, Caltrops). All of these plants were prescribed in cases of poisoning from various venoms, including snake venom, and in cases of ailments characterized by sensitizing and endogenic as well as autogenic intoxication (bronchial asthma, nettle-rash, malignant tumors, epilepsy, etc.).

The mechanism of antitoxic action of these plants is not studied in detail by contemporary science. Prostaglandin-like compounds present in some of them (e.g., Bryony) are thought to be responsible for antitoxic properties of these plants. It is worth noting that according to one hypothesis, antisclerotic, antiinflammatory, antiallergic, antitumor, hypotensive as well as some other properties of plants used in folk medicine, can be explained by the presence of unsaturated fatty acids and products of their oxidation, that are capable of interacting with prostaglandin receptors [171].

In medieval Armenian medicine, complex prescriptions that include components of plant, animal and inorganic origin with bactericidal, antisclerotic, antitumor, antitoxic and hypotensive activities, were often formed from these simple medicinal plants. Prescriptions vary with respect to prevailing symptoms: some components with sedative, anesthetic, antispasmodic, lytholitic and other properties were added according to the requirements of ethiopathogenetic and symptomatic therapy.

To freely manipulate an enormous medieval arsenal of natural Armenian medicaments, the physician-pharmacognosist had to possess not only medical knowledge and intuition, but also deep understanding of botany, zoology, chemistry and mineralogy. All these qualities harmoniously coexisted in the Armenian *bzhshkapet* Amirdovlat

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127. *Umbelliferae.*

Amasiatsi, whose *Useless for Ignoramuses* was a true encyclopedia of medieval Armenian medicine. Its influence on medieval science and medicine can not be overestimated. In the Mashtots Matenadaran there are held and preserved not only works of representatives of the Sebastia school: *The Book of Medical Art* by Asar Sebastatsi, *The Book of Medicine* by Buniat Sebastatsi, but also works of unknown authors of seventeenth and eighteenth centuries written undoubtedly under the influence of *Useless for Ignoramuses*: the dictionary *On Properties of Remedies and their Various Names* [172], *The Dictionary Compiled by New and Old Masters of Medicine* [173], *Illustrated Dictionary of Simple Remedies* [174], and *Botany and Flora of Armenia* by Stepanos Shahrimanian [175, 176]. *Useless for Ignoramuses* had been continually rewritten up to the end of nineteenth century, which made it invaluable for traditional Armenian medicine. Interestingly enough, when in 1808 Catholicos Daniel became seriously ill, a physician named Ughan Topal, who always used Amirdovlat's book, was asked to treat him [8:3:80].

N. A. Bogoyavlenskiy, an authority on Russian hand-written herbals, wrote about the importance of so-called *vertograds*, books that were close to medieval eastern pharmacognosies: "Medicinal flora of *vertograds* sums up more than a thousand botanical species, and not only is it of some interest to physicians and pharmacists, but also a precious source for studying botany, agriculture and forestry. It helps to reconstruct specific diversity of wild and domesticated vegetation of our Motherland in the past, and accurately defines the geographic distribution of useful plants, while facilitating a deep and multifaceted elucidation of some peculiarities of ancient Russia's cultural history" [177:61]. All this is also true with respect to Amirdovlat's book *Useless for Ignoramuses,* which is an outstanding monument of Classical Armenian culture. In this treatise we have attempted to show that Amirdovlat's book is of practical interest to contemporary medicine, which nowadays refers more and more often to the treasure chest of traditional medical experience of different nationalities in its search for effective treatments against allergies, malignant tumors, arteriosclerosis, geriatric ailments and some other diseases that present an ever-urgent problem even in our time.

Chronology of the Life and Work of Amirdovlat Amasiatsi

End of 1420s–beginning of 1430s: Amirdovlat was born in the town Amasia (Asia Minor) in the family of an Armenian named Yeghia.

1450s: Attended Armenian medical schools in Amatsia and Sebastia. Wandered as a traveling physician in countries of Asia Minor and Iran, studying medicinal flora of the region.

End of 1450s: Moved to Constantinople by sea. Further studies of medicinal arts, natural sciences and philosophy. Was granted a degree of *Bzhshkapet.*

1459: Created upon request of Vard, son of Shadi-bek, his first works—*The Lore of Medicine* and *Akhrabadin.*

1460s: Was selected as a chief-physician to Muhammed II Fatih, and received an honorary title of Chief Physician-Ophtalmologist. Afterwards—10 years of exile and wanderings around Balkan countries.

1466–1469: Wrote his major work on clinical medicine, *The Benefits of Medicine*, in the city of Phillipopolis (Plovdiv, Bulgaria).

1474: Created *Folk Medicine*: the book with elements of magic medicine and astrology.

1470s: Returned to Constantinople, regained his position of a chief-physician to Muhammed II, enjoys his confidence until Muhammed II's death in 1481.

1478–1482: Wrote the main work of his life: the encyclopedia of medicine *Useless for Ignoramuses.*

1481: Created the second *Akhrabadin.*

1480s: Returned to his motherland upon the invitation of Muhammed II's son Ahmed, who became a ruler of Amasia.

1490: Journeyed to the city of Brusa for treatment with mineral waters.

1496, December 8: Died in Amasia.

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